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THE MANAGEMENT OF HEALTH.

THE

MANAGEMENT OF HEALTH:

A MANUAL OF

HOME AND PERSONAL HYGIENE:

Being Practical Hints

ON

AIR, LIGHT, AND VENTILATION;
EXERCISE, DIET, AND CLOTHING;
REST, SLEEP, AND MENTAL DISCIPLINE;
BATHING AND THERAPEUTICS.

BY JAMES BAIRD, B.A.
AUTHOR OF A "GUIDE TO AUSTRALASIA," ETC.

"Non est vivere, sed valere, vita."—MARTIAL.

LONDON:
VIRTUE & CO., 26, IVY LANE,
PATERNOSTER ROW.
1867.

157. o. 124.

PREFACE.

THE science of health was far better understood by the ancients than by ourselves; and it is a fact which admits of no dispute that our progress in hygiene is retrograde—advancing backwards, so to say—to many of the home and personal appliances for the management of health which prevailed at the commencement of the Christian era. There was little or no compression in the dress of the old Roman, and that of his wife and daughters was a graceful and flowing robe, the *beau-idéal* of female attire, free alike from injurious tight-lacing and the indelicacy of crinoline. The motto from Martial which adorns our title-page is evidence of the value attached to perfect health by the ancients. "To *be* is not called life, but to *be well;*" and to Cicero, in his second book, "De Officiis," we refer the reader for what may truly be called the canon of hygiene. "Preserve health by attention to the body," is his teaching, "by temperance in living, by refraining from sensuality, and by employing the skill of those who have devoted themselves to its study."

In our variable climate warmth and ventilation are the great accessories to health. Wherever we discover the remains of a Roman dwelling we find, by the hypocaust, that neither money nor labour was spared to

secure both. Near the site is always a well of purest water, where there is otherwise a scarcity in the river supply; and, as at Carisbrooke, as many of our readers are aware, the solid rock itself was cut away to any depth to reach that great necessary of life. Of the two wells there one is 150 feet, and the other 200 feet deep. Water is ranked by Pindar as the first and greatest of the elements of old.

The Roman hot-air bath, with its cold-water accessories, singularly revived amongst us through the exertions of Mr. David Urquhart, of Cromarty, the Eastern traveller, as the Turkish bath, was a daily necessary to the Roman soldier, as is evidenced by the remains of those structures on most spots where we seek to place the site of a Roman station in our maps.

Sir Robert Atkyns, in his "History of Gloucestershire," mentions a circumstance no less interesting, as showing how careful the Romans were in securing the appliances to health. In Britain no Roman station exists where apples are not abundant. The climate, then much colder than now, was fatal to the cultivation of the grape; so apple-orchards supplied the place of vineyards, and to the Romans we owe cider, a beverage infinitely more wholesome and invigorating than the trash sold as cheap wine in this country, and so capable of supplying the place of wine, that fine old effervescing cider is drunk in perference to champagne at many of our college tables. Nothing is so damaging to the constitution as bad or adulterated wine or spirits.

"Cleanliness," says the adage, "is next to godliness." So Thomson, too,—

> "Even from the body's purity the mind
> Receives a secret sympathetic aid;"

and George Herbert inculcates a sound lesson in these glorious words:—"Let thy mind's sweetness bear its operation upon thy body, clothes, and habitation."

It has been the aim of the writer of the following pages to lay down such simple rules for guidance in the management of health as most likely to lead to a good old age. "Mature fias senex," says Cicero, in his book, "De Senectute," "si diu senex esse velis;" or, in other words, let moderation in all things be early the rule of your life. It is a golden rule. Those who never lose sight of it may truly expect that greatest of earthly blessings, "mens sana in corpore sano," to be an abiding one.

J. B.

October, 1867.

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THE

MANAGEMENT OF HEALTH.

CHAPTER I.

INTRODUCTORY.

HEALTH is the greatest of earthly blessings, and the sweetener of every other. Without it we come short of the usefulness and happiness of which we are capable. To preserve it, therefore, is both our duty and our interest. The object of this brief treatise is to point out the means of doing so.

Every one should acquaint himself, as far as possible, with the conditions on which alone he can have "a sound mind in a sound body." If this involves some trouble, the object to be gained is worth it ten times over; emphatically, *the game is worth the candle.* Success in life, as well as enjoyment of life, very much depends on the amount of health which a man is able to maintain.

Circumstances, no doubt, often compel people to sacrifice health for the means of present livelihood. They must follow unhealthy employments and live in unhealthy situations. Soldiers and sailors and emigrants must occasionally be in deadly climates, artisans have often to toil in unhealthy workshops, and poverty often compels residence in stifling and pestilential neighbour-

hoods; but even in such cases a knowledge of the laws of health will do much to mitigate, if not to remove, attendant evils. Indeed, it is generally the want of such knowledge that causes the evils to spring up; for, where it has been present to direct, men have been kept healthy even in the most unfavourable circumstances, whereas, where this knowledge has been wanting, men have lost health in spite of all surrounding circumstances being favourable to its preservation.

Health has been defined as that condition of body in which all the functions are performed harmoniously, with ease, and with a feeling of well-being. Each organ acts unconsciously; the whole bodily energies seem to play their part together, and the union is so complete that we neither feel nor care to inquire how the machine works: we are only sensible that the movements are simultaneous.* Every deviation from this

* "That condition of the body which is called *health* includes the conception of an equilibrium among all the causes of waste and of supply; and thus animal life is recognised as the mutual action of both, and appears as an alternating destruction and restoration of the state of equilibrium.

"In regard to its absolute amount, the waste and supply of matter are, in the different periods of life, unequal; but, in the state of health, the available vital force must always be considered as a constant quantity, corresponding to the sum of living particles.

"Growth, or the increase of mass, stands at every age in a fixed relation to the amount of vital force consumed as moving power.

"The vital force which is expended for mechanical purposes is subtracted from the sum of the force available for the purpose of increase of mass.

"The active force which is consumed in the body in overcoming resistance (in causing increase of mass) cannot at the same time be employed to produce mechanical effects.

"Hence it follows necessarily, that when, as in childhood, the supply exceeds the waste of matter, the mechanical effects produced must be less in the same proportion.

"With the increase of mechanical effects produced, the capacity of increase of mass or of the supply of waste in living tissues must diminish in the same proportion.

"A perfect balance between the consumption of vital force for supply of matter and that for mechanical effects occurs, therefore, only in the adult state. It is at once recognised in the complete supply of the matter consumed. In old age more is wasted; in childhood more is supplied than wasted."—*Liebig*.

state is either disease or an indication of its approach. How, then, are such deviations to be prevented and the state of health made continuous? By living agreeably to Nature.

It is obvious, however, that, in order to the enjoyment of perfect health, even with all due observance of Nature's laws, there must be a sound constitution to work upon. This does not fall to the lot of every one. Many are born with a certain *virus* in their system, in consequence of which they are subjects of this or that form of disease. Apart, moreover, from those instances where specific diseases are inherited, there are amongst the human family certain well-marked differences which, though not in themselves diseases, predispose to particular diseases, or modify whatever disease the individual may suffer from. These differences—and it is well to know something of them—have received the names of temperaments, diatheses, and idiosyncrasies, and may be described as follows:—

The temperaments are four, viz.—the *sanguine*, the *phlegmatic*, the *bilious*, and the *nervous*.

The *sanguine* temperament is indicated by a moderately plump person, firm flesh, red or light chestnut hair, fair and florid complexion, thin and soft skin, large blood-vessels, active circulation, and full and frequent pulse. The countenance is animated, the mind unsteady, the movements are quick, and the passions excitable.

The *phlegmatic* or *lymphatic* temperament is known by the round form, soft muscles, full cellular tissue, fair hair, light blue, hazel, or grey eyes, pale skin, fleshy lips, and expressionless countenance of the individual. The blood-vessels of the lymphatic are small, with languid circulation and unfrequent pulse, and there is generally torpidity of the bodily and mental functions.

The *bilious* temperament is characterised by harshly-expressioned outlines of the person, with moderately full and very firm flesh, strongly-marked features and decided expression of countenance, swarthy complexion,

dark brown or black hair and eyes, prominent veins, and full firm pulse. The *bilious* display great energy of character and power of endurance, and their impressions, physical and mental, are lasting.

The *nervous* temperament is recognised by a spare form and soft slender muscles, delicate features, fair hair, pale complexion, thin lips, light and sparkling eyes, small and quick pulse, and great susceptibility to impressions and emotions. There is great activity of the brain and nervous system, acuteness of the senses, and liveliness of the imagination.

A *melancholic* temperament is occasionally met with, characterised by calm and somewhat gloomy seriousness and great tenacity of impression. This temperament is akin to the bilious.

These temperaments are seldom found pure, most individuals having two or more in combination, though with one predominant. *Mixed* or *compound* temperaments is the term usually employed to designate such combinations. Such compound terms as *nervous-lymphatic*, *sanguine-nervous*, and *sanguine-bilious*, are employed to indicate the union—the predominant temperament being placed first in order. It is not, however, in every case that the union can be recognised: in many instances the temperaments are so blended that it is hardly possible to say which is the predominant.

According to his temperament, a man becomes liable or predisposed to this or that class of diseases. We see acute inflammation and active hæmorrhage most frequently afflict the sanguine, congestion and sub-acute inflammation the phlegmatic, who are also frequently afflicted with glandular and tubercular diseases. On the other hand, disorders of the digestive organs, as hypochondriasis and melancholia, assail chiefly the bilious; while the nervous suffer from disorders of the nervous system, attended often with excitement and even mental derangement.

Certain other peculiarities have received the name of

diatheses. There is, for example, the scrofulous or strumous *diathesis*, indicated by a fair complexion, fine hair, grey or blue eyes with long eyelashes, and thick upper lip. The consumptive diathesis is indicated by the same characteristics, only the upper lip is thin instead of thick. There are also the *oxalic acid, lithic acid,* and phosphatic diatheses, wherein the individuals respectively pass with the urine an excess of oxalate of lime, lithic acid and its salts, or phosphoric acid and its salts. Derangement of health accompanies these peculiarities.

These differences of temperament and diathesis being transmitted from one generation to another, cause those marked diversities which we see in the constitution and tendencies of the individuals composing the human family.

In a few cases there are found very striking peculiarities, to which the term *idiosyncrasies* has been applied. Some individuals, for example, are powerfully affected by very small doses of medicine, which would be almost inoperative in ordinary cases, others experience on taking medicines exactly the reverse of their usual action, and a third class suffer severely from partaking of certain articles of diet of an ordinary and wholesome character. There are also mental *idiosyncrasies* characterised by strange and whimsical preferences and aversions.

In addition to these peculiarities which may be said to be born with the individual and to grow with his growth, there are others connected with climate, employment, situation in life, age, &c., which have an important influence in modifying the health of individuals. All these peculiarities should be noted by each individual with a view to modify hygienic measures in accordance with the indications they afford. Experience of one's constitutional peculiarities will, with a moderate amount of reading, and, if necessary, occasional medical advice, enable most persons to hit upon the course which in the circumstances is best fitted

to preserve and promote the vigour of the physical system. The aim of this work is to point out generally those conditions on which Nature vouchsafes to man the blessings of health, and which, if attended to, will secure as large a measure of these, and as prolonged life, as the constitution of the individual admits of. Whatever the temperament, diathesis, or idiosyncrasy of the reader, he will by the perusal of the following pages obtain such information as will enable him to live agreeably to Nature, and to reap the benefits she bestows on those who observe her laws. Once intelligent on the subject of those general rules or principles on the observance of which the maintenance of health depends, he will have little difficulty in finding out and putting in practice whatever special hygienic measures his peculiarities of constitution and circumstances may call for. If blessed with a sound constitution, and a position in life not incompatible with health, he will find the truths enunciated in the present volume a sufficient guide to conduct him through a healthful and enjoyable youth and manhood to a hale and hearty old age.

In fulfilling the task here undertaken, recourse will be had to the recorded experience and observation of those eminent physiologists who have made a special study of the elements and principles which contribute to the maintenance of the human frame in health and vigour, and to the securing of the longest possible term of longevity. These elements or principles may be comprised under the heads of Air, Light, and Ventilation, Exercise, Clothing, Diet and Beverages, Bathing, scientifically employed, Repose and Sleep, and Mental Discipline, or the regulation of the emotions and operations of the mind so as to promote the well-being of both mind and body. As, moreover, amid the infinite diversities of human life and circumstances health is often unavoidably impaired or lost, it will be expedient to indicate in conclusion the means by which it may be regained. In regard to these means comprehended

under the general term *Therapeutics*, there are conflicting opinions, and often fierce disputes, but the writer having no particular theory to uphold, will content himself with pointing out only such as approve themselves to intelligence and common sense.

CHAPTER II.

AIR, LIGHT, VENTILATION.*

AIR to breathe is the first necessity of our life. Deprived of it for a few minutes, we die.

Before birth life is purely vegetative. The nutritive process alone is called into operation. After birth commences a new process, of which vegetables are destitute, that of *respiration*, or the continual absorption of the oxygen of the air through the lungs and skin, and its combination with certain constituent parts of the body. There is no intermission of this process while life continues.

Modern chemistry informs us that the atmosphere around us is composed of certain gases with a varying quantity of water in a state of vapour. Pure air consists of 21 parts of oxygen gas and 79 parts of nitrogen or azote, with about 1 per cent. of carbonic acid gas formed by a chemical combination of certain parts of oxygen and carbon. The oxygen and azote of the atmosphere are intimately mixed together, so that, taking a given volume of air, no sooner is a portion of its oxygen consumed than the remaining oxygen diffuses itself throughout the entire volume with a rapidity in proportion to the rate of consumption. This law of Nature is of immense importance

* Consult "Rudimentary Treatise on Warming and Ventilation," by Professor Tomlinson, No. 57 of the "Weale Series."

to all animated existence—oxygen being the nutrient property of the air.

Within the cavity of the chest are the large, light, elastic, and spongy bodies, the lungs, whose office it is to draw in the atmospheric air. Rushing in by the throat or windpipe, the air distends the innumerable cells with which the lungs are permeated, inflates them, and so brings their surface into immediate contact with the walls of the chest. The muscular contractions by which this is effected then cease, antagonist muscles come into play, and the chest returning to its previous condition, the inspired air is driven out. Such is the ordinary mechanical act of respiration. The quantity of air drawn in by the lungs at each inspiration varies from 15 to 40 cubic inches, according to age, constitution, and other circumstances. The largest quantity known to have been inhaled at one forced inspiration is stated to have been 9¼ pints, an ordinary inspiration with no effort draws in 1 imperial pint, an easy inspiration without any great effort 2½ pints. After expiration, or the expulsion of the air inspired, there still remains a large quantity of air in the lungs, by which the individual is enabled to "hold his breath for a time" without fatal consequences. Without this there could be no *diving*. Dr. Southwood Smith estimates the quantity thus retained at 11 pints. By the retention of this large quantity, which, however, is being constantly renewed, the action of the air upon the blood is rendered continuous.

This leads us to speak of the uses of respiration. They are these:—(1) To purify the blood; (2) to evolve heat and develop vital force.

1. The blood once formed by the nutritive processes, is put into circulation throughout the body, in which process are concerned the heart, the arteries, and veins Propelled from the *left* ventricle, or lower compartment of the heart, through the arteries to the extremities of the capillaries, or minute surface-vessels, it deposits through them the nutrient particles with which it is

charged. Thus the body is built up. Returning by the veins, the blood bears along with it the effete, worn-out materials of the body taken up by the capillaries—which remove the old as well as deposit the new matter—and thus charged it courses along to the *right* auricle, or upper compartment of the heart, whence it is driven by the heart's contractions into the right ventricle, from which again it is propelled into the large pulmonary artery. This artery, dividing into two branches, one entering the right the other the left lung, conveys the dark, vitiated, venous blood to the capillaries, or minute vessels distributed along the walls of the air-cells of the lungs. There it is brought into contact with the oxygen inspired, which dissolves and excretes the worn-out materials which the blood took up from the system, and makes it once more pure, red, arterial blood. Thus purified, it passes through the pulmonary veins to the left auricle of the heart, from which it is propelled into the left ventricle, whence it first issued. Forced into the aorta, or great artery, by the contraction of the heart, it is made to repeat its revolution through the arteries and veins, discharging the same offices as before.

The effete and worn-out materials referred to as brought with the venous blood to the lungs, are carried off with the expired air in the shape of carbonic acid, watery vapour, and animal effluvia. Thus, exhalation from the lungs is one of the chief outlets of waste matter from the system. Hence the offensive breath of those whose system is disordered, and whose blood is in a bad state, so sending forth an abnormal amount of vitiated elements. Hence, also, the disagreeable, sickening smell which prevails in crowded rooms.

From these facts the importance of pure air to breathe will be evident to every one. Air deficient of the due proportion of oxygen, and surcharged with carbonic acid gas from breathing lungs, cannot when inhaled efficiently discharge the office of purifying the blood. Consequently, the blood unpurified is again

sent coursing through heart, arteries, and veins, becoming more vitiated at each revolution, until, Nature making a vehement effort to rid herself of the incubus, typhus, cholera, dysentery, or other malady supervene. The great scourge of Britain, *Consumption*, is also a frequent result of this state of things.

"Imperfectly oxygenised blood, besides being incapable of duly nourishing the tissues, cannot afford a due stimulus *to the nervous system*, and this is one of the causes of languor and debility which precede the outbreak of *consumption*. This feeling, again, indisposes to exercises, and the withdrawal of the fresh air predisposes to the malady.

"According to the calculations of Mr. Farr, in the statistical returns for 1838, 3·8 males in 1,000 died of consumption, whereas in females the proportion was 4·1 in 1,000, the actual numbers having been 27,935 to 31,090. This higher mortality of English women in consumption, he remarks, may be ascribed partly to *the in-door life* they lead, and partly to the *compression* of the chest by stays, and other parts of costume. In both ways they are deprived of free draughts of vital air, and the altered blood deposits tuberculous matter with a fatal and unnatural facility. When to diminished capacity of the lungs, thus produced by external compression, the breathing of an already vitiated atmosphere is added, the quantity of oxygen inhaled is still further reduced, the blood is still more imperfectly aërated, and as a necessary consequence the health is still more rapidly deteriorated."*

On the other hand, where there is an abundant supply of pure air, by the inhalation of which the blood is properly oxygenised, the system acquires tone and energy, with a general exaltation of all the functions, provided there be a sufficient supply of wholesome food wherewith to make blood. The dark, vitiated, venous blood becomes bright-red arterial blood, fitted to supply

* "Principles of Physiology," by Dr. A. Combe.

all the wants of the animal economy. In proportion to the aëration of the vital fluid is it endowed with those properties which invigorate all the organs, give elasticity and exhilaration to every part of the system, buoyancy to the spirits, and strength to the intellect. Nothing tends more to the maintenance of health and the removal of disease, whether of body or mind.

2. The second use of respiration is the evolution of heat and development of vital force. These objects are effected by the oxygen inhaled combining with the carbon and hydrogen of the food. Professor Liebig tells us that—

"The mutual action between the elements of the food and the oxygen conveyed by the circulation of the blood to every part of the body is THE SOURCE OF ANIMAL HEAT.

"All living creatures whose existence depends on the absorption of oxygen, possess within themselves a source of heat independent of surrounding objects.

"This truth applies to all animals, and extends, besides, to the germination of seeds, to the flowering of plants, and to the maturation of fruits.

"It is only in those parts of the body to which arterial blood, and with it the oxygen absorbed in respiration, is conveyed, that heat is produced. Hair, wool, or feathers do not possess an elevated temperature.

"This high temperature of the animal body, or, as it may be called, disengagement of heat, is uniformly and under all circumstances the result of the combination of a combustible substance with oxygen.

"In whatever way carbon may combine with oxygen, the act of combination cannot take place without the disengagement of heat. It is a matter of indifference whether the combination take place rapidly or slowly, at a high or at a low temperature; the amount of heat liberated is a constant quantity.

"The carbon of the food, which is converted into carbonic acid within the body, must give out exactly as much heat as if it had been directly burnt in the air or

in oxygen gas; the only difference is, that the amount of heat produced is diffused over unequal times. In oxygen, the combustion is more rapid, and the heat more intense; in air it is slower, the temperature is not so high, but it continues longer.

"It is obvious that the amount of heat liberated must increase or diminish with the quantity of oxygen introduced in equal times by respiration. Those animals which respire frequently, and consequently consume much oxygen, possess a higher temperature than others, which, with a body of equal size to be heated, take into the system less oxygen. The temperature of a child (102 deg.) is higher than that of an adult (99·5 deg.); that of birds (104 deg. to 105·4 deg.) is higher than that of quadrupeds (98·5 deg. to 100·4 deg.) or than that of fishes or amphibia, whose proper temperature is from 2·7 deg. to 3·6 deg. higher than that of the medium in which they live. All animals, strictly speaking, are warm-blooded; but in those only which possess lungs is the temperature of the body quite independent of the surrounding medium.

"The most trustworthy observations prove that in all climates, in the temperate zones as well as at the equator or the poles, the temperature of the body in man, and in what are commonly called warm-blooded animals, is invariably the same; yet how different are the circumstances under which they live!"

Again, in reference to vital force, the same author remarks:—"There are various causes by which force or motion may be produced. A bent spring, a current of air, the fall of water, fire applied to a boiler, the solution of a metal in an acid,—all these different causes of motion may be made to produce the same effect. But in the animal body we recognise as the ultimate cause of all force only one cause, the chemical action which the elements of the food and the oxygen of the air mutually exercise on each other. The only known ultimate cause of vital force, either in animals or in plants, is a chemical process. If this be prevented, the

phenomena of life do not manifest themselves, or they cease to be recognisable by our senses. If the chemical action be impeded, the vital phenomena must take new forms."

All animal heat, nerve force, animal functions, and the material operations of the brain itself, depend, therefore, upon the efficiency with which the processes just described are carried on; in short, upon the continuous absorption of oxygen and the elimination of carbonic acid gas. Heat is evolved in the formation from the food of healthy blood, and it is from the blood that each organ, tissue, nerve, filament, and, in short, every structure within the body, derives material for renewal, and their power and efficiency are proportionate to the regularity with which they exchange their worn-out substance for new materials. All health and vital energy are the result of this incessant change of matter in every part of the frame, and this change is effected by the circulation and aëration of the blood. How essential the last-named process is to *vitality* is well shown by Professor Draper:—

"The arterial blood, *containing oxygen*, with which it is ready to part, and being prepared to receive in exchange the *carbonic acid*, which the tissues and general structures of the body set free, must obviously have a greater affinity for the tissues than venous blood, in which both these changes have already been effected. Consequently, upon mere physical principles, the arterial blood, which enters the capillaries on one side, must drive before it, and expel on the other side of the network, the blood which has become venous while traversing it. *But if the blood which enters the capillaries have no such affinity* (*i.e., contains no such oxygenated substances*), *no such motor power could be developed.* On the other hand, in the capillary vessels of the lungs, the opposite affinities prevail. The venous blood returned to the heart, and expelled again to the lungs, and the air in the pulmonary (lung) cells, have a mutual attraction, which is satisfied by the exchange of carbonic acid

for oxygen gas, that takes place through the walls of the capillaries, and when the blood has thus become arterialised, it no longer has any attraction for the air. Upon the very same principle, therefore, the venous blood will drive the arterial before it in the pulmonary capillaries, whilst respiration is going on; *but, if the supply of oxygen be interrupted, so that the blood is no longer aërated, no change in the affinities takes place whilst it traverses the capillary network.*"

The consequences are arrest of the change of matter, stoppage of the circulation, and, finally, extinction of the vital force.

Without a due supply of oxygen, then, to combine with the carbon within the body, there can be no adequate renewal of its structures, no comfortable warmth diffused to its extremities (hence burdensome clothing will be required), and no gratifying consciousness of power in muscle and nerve. The individual becomes a comparatively feeble valetudinarian—pale, sickly, and always complaining of some ailing or other, until, if the deleterious cause continues to operate, premature death closes the scene.

In connection with the subject of pure air, the importance of a proper access of light must not be overlooked. Excluded from the light, both animal and vegetable life droop and languish. We see this in the pale, sickly plant which by accident has been shut out from the sunlight, and in the pale student, artisan, or other sedentary toiler whose avocation deprives him of the influence of the "merry sunshine." Contrast these with the gay parterre on which the sun's rays beat the livelong day and the embrowned toiler in the fields, the huntsman, or indeed any one who is much exposed to the solar rays. Then, whatever be the subtle mode in which light exercises its agency upon the system, all must be sensible of the exhilarating effect of the sunshine upon the spirits, as well as upon the vigour and elasticity of the frame. From this fact some have advocated what is called the "sun-cure," or the invigoration of delicate

individuals by the exposure of the entire person (the head being protected) to the direct rays of the sun for a number of hours daily. Those who have tried this expedient speak highly of its beneficial effects; and where there is an opportunity of resorting to it, we have no doubt as to the salutary influence it would have upon the organisation.

By all means within reach, therefore, every one should see to having an ample supply of light and air. Yet, to how great an extent is this paramount necessity overlooked in the construction of our dwellings and places of public concourse, in workshops, and in the crowded quarters of our great cities! In these last the evils arising from a confined atmosphere are aggravated by the want of efficient sewers, and a scanty supply of water; hence, accumulations of decayed animal and vegetable matter, which still further poison the atmosphere with noxious gases—carbonic acid, or the more immediately fatal sulphuretted hydrogen or carbonic oxide. All these pollute the air of filthy, crowded, and smoky neighbourhoods, silently and surely doing their deadly work in the ratio of their presence in the atmosphere inhaled by the lungs. How is it possible that those living in such poisoned localities can know what health and vigour is? Dragging through a sickly existence, their fate is an early grave. Fever, cholera, or some other epidemic cuts them off.*

But even where thoroughly efficient sanitary regulations remove promptly all such animal and vegetable refuse as would by decomposition poison the air with deadly gas, infinite mischief may result from mere want of ventilation. The office of the lungs in ridding the body of waste matter has already been spoken of, but in

* The attention now being paid to the improvement of the sanitary condition of workmen's dwellings is a hopeful augury for the future. In the *Illustrated London News* for July 6th, 1867, there is an admirable description of the model dwellings and collateral appliances on view at the Paris Exhibition, by Mr. Chadwick, who, in concluding, observes that in these will be found "the means of very important advances in the improvement of the dwellings of the great mass of the

this respect the functions of the skin are not less important. Like the lungs, the skin is both a respiratory and depurating organ, continually consuming oxygen and eliminating carbonic acid gas, and pouring forth vapour in the form of insensible or sensible perspiration. Indeed it is maintained that the external skin not only exceeds any other depurating organ, but all the others —lungs, bowels, kidneys, &c.—put together, in the quantity of matter it eliminates from the system. It is evident, therefore, that wherever human beings are confined within the walls of a building the air within the enclosed space must be momently taking up the emanations from their skin and lungs, while, at the same time, it is parting with its oxygen for the maintenance of their vital processes. If, therefore, the air within the apartment or building be not continually renewed from without, it will become so loaded with

people—in the means of relieving them from the cesspool, or the bad drain and sewer emanations and smell; from the foul-wall smell, and from the wall vermin; from the damp walls; from the smoke nuisance; from a great proportion of the waste of fuel and the loss of heat; from stagnant and vitiated air; from the deterioration of good water supplies; from much of the exclusion from sunlight. And it is proved that by new appliances their dwellings may be made cooler in summer, and warmer in winter; and that too, not only without any increase, but with a very material reduction of direct expense. I say of direct expense, because when the losses from excessive sickness, premature disability, and premature mortality, are taken into account, a great proportion of common dwellings of the wage classes, though they may be cheap to construct, are indirectly and eventually dear to use. By dwellings with the improvements specified, insurances against sickness, disability, and mortality would be reduced nearly one-half. With clean, light, bright, warm, comfortable, and healthful dwellings; with the habits of personal cleanliness, sobriety, and frugality, to which such conditions would conduce, a new and improved population would arise. To one accustomed to inspect town schools in the lower districts, the comparative condition, external as well as internal, of the dwellings, may to a considerable extent be inferred by the comparative aspect and condition of the children. Already in neighbourhoods where partial sanitary improvements have been made for a few years, school teachers mark an improvement in the condition and quality of the children received from them, who are less squalid, less ugly and vicious, and more apt for instruction. It is now generally admitted by all who have attended to the subject, that moral and social advancement is dependent on physical improvement, and that on the sanitary improvement of dwellings."

animal effluvia as to be utterly unfit for the purposes of respiration.

A mournful illustration of this truth is found in the story of the Black Hole of Calcutta. One hundred and forty-six Englishmen were thrust into a prison apartment 18 ft. square, and having only two small windows, *both on the same side*, so there could be no ventilation. The door was shut, and the scene of struggle and suffocation which followed would be painful to dwell upon. Only twenty-three were found alive next morning, and many of these died of putrid fever generated by the effluvia they had inhaled during that dreadful night. A not less lamentable catastrophe from the same cause occurred on board the Irish steamer "Londonderry," on the stormy night of December 1st, 1848. One hundred and fifty passengers were thrust below into a narrow cabin, where there was no ventilation. Before morning, seventy were suffocated. These extreme instances forcibly illustrate the danger incurred by inhaling air deprived of its due proportion of oxygen and loaded with animal effluvia, even from persons in perfect health.

It is a melancholy fact that thousands of lives are annually sacrificed, in all classes of the community, through neglect of ventilation. Especially is this the case amongst the industrious and labouring classes. So lamentably ignorant are many of these of the imperative necessity of pure air to breathe, if they would enjoy health and prolong life, that where, as in the model dwellings for the working classes lately erected in the metropolis, apparata for the ventilation of their dwellings have been provided, they have deliberately closed them up with the idea of keeping themselves warm. It has become necessary to conceal the ventilating apertures by ingenious ornamental devices, in order to save the inmates from the effects of their own ignorance and folly. Now that the "schoolmaster is abroad," it is to be regretted that these meritorious people should not be instructed a little more as to the laws of health.

But in our churches, theatres, ball-rooms, halls for public meetings, under-ground railways, &c., ventilation is as yet scarcely attended to as it should be, nor is sufficient attention paid to it even in the private dwellings of the more comfortable or opulent classes. Hence, headache, languor, and debility, which, through want of thought, are not traced to their true cause. Moreover, in all the places now referred to, the vitiation of the air is rendered more rapid by the gas-illumination employed. One gas-burner consumes more oxygen and evolves more carbonic acid than would six or eight candles. Consequently, wherever gas is employed to illuminate, not only should additional pains be taken to secure the constant introduction of pure air, but also for the escape of gas through a funnel or tube, from the apartment. The tube might be conveyed to the chimney where there is one, and to the external air where there is not.

People who value their health should avoid crowded assemblies of whatever kind, where attention is not paid to ventilation. To the healthy the stifling atmosphere of such resorts will do harm; to the delicate it may prove fatal, for with their low vitality the poisoned air may so contaminate their system that all after-measures to counteract the evil may prove unavailing. Besides, it is not a pleasant idea that of breathing air contaminated by the vitiated, perhaps diseased, emanations from the skin and lungs of other people. Dr. Combe well remarks:—

"The *expired* air contains on an average 4 per cent. of carbonic acid, consequently, if on analysis the air of any room be found to contain this proportion of carbonic acid, it will prove that all the air present has passed through the lungs. If the proportion of carbonic acid be one-half per cent., then an eighth of the whole mass of air must have passed through the lungs; and, accordingly, as soon as the amount of carbonic acid reaches one-half per cent., every inspiration we make contains an eighth less than the normal amount of oxygen, and an eighth

part of the inhaled air has already passed through our own or our neighbour's lungs. This amount of vitiation is of common occurrence, and we thus frequently yet strangely witness the most fastidious individuals, who would scruple to eat what had been touched by their neighbour's hand, inhale, without objection, the breath which has just issued from their neighbour's nostrils."

A like necessity exists for ventilating the sitting-rooms and bed-rooms of private dwellings. Now no room can be said to be well ventilated which has not an outlet for the foul, and an inlet for the fresh air. The former should be at the highest possible point in the apartment, for the animal and gaseous exhalations being lighter than the air, ascend, and they would thus escape at the outlet provided for them. On the other hand, ingress for the fresh air should be provided as low down as practicable, beneath the floor is the best mode, and the air should be admitted through perforated metallic plates capable of being regulated so as to admit the exact amount required, which should be made to traverse the whole of the apartment in its course to the outlet provided. It would, of course, carry with it the impurities which rendered its introduction necessary.

"In a sanitary point of view," says Dr. Combe, "it becomes a matter of great practical importance to determine the amount of fresh air that ought to be supplied to every individual as necessary to healthy respiratory action. Suppose each individual inhales 16 pints of air per minute, and returns 4 per cent. of the respired air as carbonic acid: we have an hourly consumption of 120 gallons of air, and a formation of 5 gallons of carbonic acid. 120 gallons of air, then, is the lowest amount which must be supplied hourly to every individual for respiration, provided all the carbonic acid is carried off as formed. But a much larger supply will be necessary if no measures are adopted for carrying off the carbonic acid—in other words, *if there be no outward ventilation.*

"The proportion of carbonic acid in the atmosphere is about 4 parts to 10,000, and, consequently, if 5 gallons be diffused through the air, 5,000 will be required to give the proportion of 10 parts in 10,000. Hence, though 120 gallons, or 19·25 cubic feet of air, would, with perfect ventilation, be a sufficient hourly supply, to yield the necessary oxygen, an individual *would require* 5,000 *gallons, or* 802 *cubic feet, if shut up in a close room where all renewal of air is impossible, to keep the carbonic acid from exceeding one part in a thousand.* In ventilating apartments, therefore, the object must be to remove the foul air as fast as it is formed, and for this purpose a minimum supply of 250 cubic feet of fresh air for every individual should be hourly introduced. The languor, exhaustion, headaches, &c., which occur in churches, theatres, ball-rooms, are just so many warnings that ventilation is not properly attended to, and that the system is suffering in consequence."

Those who are strong and healthy, and not afraid of admitting the external air into their apartments, should throw open their windows or doors and let the air find its way to the chimney—which, by the way, should never be *stuffed* in summer when there is no fire burning—and so flood their sitting apartment with good wholesome air. They should never vacate the apartment for any time without leaving the window or windows wide open, if the weather permit. In all cases there should be at least a little bit open at the top or bottom of the window. Nothing is more repulsive than encountering a close atmosphere in one's room on coming in from the fresh air without.

If abundance of pure air be necessary during our waking hours, it is still more so during the hours of sleep. The Iron Duke set the example of discarding bed-curtains, and allowing the night air free access to his chamber. In humble imitation, the present writer eschews curtains, and keeps his bed-room window open all night. The pure night air—the air of London is

purest during night—comes in at the open window, and sweeps, not, however, in a direct current, over the bed in its passage to the chimney. Thus he breathes pure, wholesome air all night long, and never catches cold. But whether or not this plan commend itself to the reader, let him contrive by some means to have plenty of fresh air during sleep, and he will find the benefit of it in increased vigour and elasticity of body and mind.

Besides well ventilating his sleeping apartment, every one would find it conducive to health to take what Dr. Franklin calls an air bath every morning on getting up. As the skin is a breathing organ, it should not only be kept clean, but exposed freely to the embraces of the pure air for five or ten minutes at least once in the twenty-four hours. It is a most salutary practice to doff the night-dress on rising, throw open the window, and in a current of fresh air to exercise the skin with a coarse towel or with the flesh-brush. If with this a bath or cold sponging be conjoined, so much the better. Such measures make a marvellous difference on one's comfort, strength, and spirits throughout the day.

Moreover, the pent-up denizen of the large city should embrace every opportunity of having an "outing" in the country, a trip to the sea-side, or a participation in those exercises which expand the chest and give full play to the lungs. The salutary influence of "change of air," though the rationale of it may be difficult to explain, is too well known to need insisting on, and motion and exercise, by increasing the respiration, greatly contribute to the furtherance of those important processes to which it is subservient. This change of air is as necessary to the dwellers on the coast and to agriculturists as to the pent-up citizen; and a visit to towns and cities is as beneficial to them, as a sojourn in the country is to the latter. How common is it for the studious and sedentary to be attacked by nervous oppression and dull headache, which are forthwith dispelled by engaging in some athletic sport, by a smart

walk or ride into the country, or by a day or two spent at the coast. The enhanced respiration of pure air enables us to return to our labours freed from annoying feeling of sickness, with bright eye, animated countenance, and elastic step. The pent-up citizen and toiling artizan would droop without such occasional holiday.

To none is a constant supply of pure air of more importance than to young children. When stinted in this great essential to health, they soon become puny, sickly, and diseased. It is therefore an imperative duty of parents to see that the nursery is well ventilated, night and day, and kept free from all effluvia which would diminish the salubrity of its atmosphere. Besides, children should as much as possible be carried abroad into the open air. The perambulator, though sometimes in the way in a crowded thoroughfare, is a very useful institution. But for infants there is no conveyance so good as the arms of the kind and judicious mother or nurse, and when they are old enough to run alone they should be conveyed to some safe greensward and allowed to scamper about at will, and so oxygenise their blood.

Old people, too, require plenty of pure air to keep them in tolerable health. They should be abroad in the open air as much as possible; but as they cannot do this so often as when they were younger, and sometimes not at all, the more care should be taken that their apartments be thoroughly ventilated, and, moreever, kept at a suitable temperature. Of course that ought to be higher than would be good for young, healthy people.

Speaking of temperature, a great deal of mischief is done by rooms being over-heated. The Americans are said to injure their health by the excessive heat of the stoves in their apartments. Nor is this error avoided amongst ourselves; hot rooms are a fruitful cause of the delicate health of many. Physiologists, let it be noted, always select the coolest quarter on seating themselves in an apartment.

Pure air, then, of moderate temperature, is the prime source of health to the body through aëration of the blood. It is thus promotive of the change and renewal of structure, of animal heat, and of vital energy. It is the grand agent in furthering all the processes of nutrition,—it braces the nerves, plants roses on the cheeks, makes the plain look pleasing, and the lovely more lovely still.

CHAPTER III.

EXERCISE.

If all men followed the primitive pursuit of cultivating the soil and rearing domestic animals, there would be no occasion for a dissertation on exercise. The ploughman, the shepherd, the gardener, the milkmaid, the waggoner, &c., find ample exercise, as well as wholesome air, in the act of carrying on their calling. But civilisation, commerce, the arts, learning, and refinement, have, along with immeasurable benefits, brought also some evils, and one of these is frequent loss of health, through sedentary habits, and inattention to the due exercise of the voluntary muscles. Tens of thousands amongst us suffer grievously from exercising the brain too much and the muscular system too little.*

* "If the human being," remarked Dr. Combe, "were all brain and nervous system, we might very reasonably content ourselves with sedentary pursuits, and confine ourselves entirely to the occupations of the mind. But when observation tells us that we have *numerous other important organs*, of motion, sanguification, digestion, circulation, and nutrition, *all demanding exercise in the open air*, as essential both to their own health, and to that of the nervous system, it is worse than folly to shut our eyes to the truth, and to act as if we could, by denying it, alter the constitution of our nature, and thereby escape the consequences of our misconduct."

To those compact bundles of fleshy fibres immediately under the skin and subjacent adipose tissue the term "muscles" is applied. They are the organs employed in all physical exertion. Each muscle is made up of countless thready fibres, connected by cellular structure, which is also interposed to separate one muscle from another. Taking their origin from some process of bone, the muscles are of an elongated form, thickening considerably at the middle, and thence gradually tapering to a comparately small, white, shining tendon, firmly adherent to another bone, and free to move upon it. The largest of these tendons is that just above the heel—the tendon of Achilles.

The muscles now referred to are called "voluntary muscles," because they are under the control and execute the behests of the will. Situated generally not far from the skin, they form very much of the external case or walls of the body. The broad tendon of one of them covers the skull, and a multitude of smaller muscles ramify through the face, and by their action give it all its varieties of form and expression. The muscles of the tongue, lips, glottis, and the respiratory muscles, are called into play in speaking and singing. The extremities are composed almost entirely of muscle and bone, and altogether the voluntary system of muscles is of such magnitude as to comprise, in the estimation of *eminent physiologists, one-third of the whole body.* There is also an interior muscular system not under the control of the will, and therefore called "involuntary," to which belong the muscles of the *throat,* the *fauces,* the *œsophagus,* and the muscular layer of the stomach and intestinal canal. In the chest, too, there is the muscular development of the glottis and bronchial tubes; moreover, the entire structure of the heart is muscular. In the pelvis are the muscles of the depurating and reproductive organs. These interior muscular organs are for the most part controlled and set in motion by their own contents, *e.g.*, the heart by the blood, the stomach by the food, &c. By these contents

the organ is excited; that excitement is conveyed by certain nerves to the spinal marrow, from whence it is reflected back on the organ, so as to induce its contraction. This is called the "excito-motory system." The involuntary muscular system being essential to the carrying on of the vital processes, and hence to life itself, is not under the control of the individual, and is placed in the interior of the frame, as far as possible beyond the reach of injury, and this is the case in the ratio of the importance of the several organs.

It is with the voluntary muscles forming beneath the skin the shell, or outer walls of the body, that we have at present to do. These are well supplied with blood for their nutrition and development, which take place in proportion as they are exercised, and with nerves by which they are brought under the control of the will. They constitute the entire mechanical power and physical strength of the body, and the measure of their power depends—1, on the power of the nerve-current directed upon them from the cerebro-spinal system; and, 2, on the amount, purity, and nutritive qualities of the blood with which they are supplied. These, again, must ever be in proportion to the amount of food taken, the amount of pure air inhaled, and the rapidity with which the "change of matter" takes place within the body. How *exercise* bears upon all these conditions of power shall now be shown.

Exercise, or voluntary motion, produces, in the first instance, certain mechanical results. By the activity of the muscles an impulse is given to the current of blood traversing the arteries and veins so that it moves with enhanced speed, and is forced with increased momentum into the capillaries or minute vessels, so numerously distributed throughout the body, and which take up the effete tissue for elimination, and deposit new. Exercise at the same time compels the lungs to more vigorous action, causing full and deep inspirations, and so an increased amount of oxygen is brought into contact with the venous blood distributed through the

pulmonary capillaries. Thus, by the promotion of the two mechanical acts of circulation and respiration, exercise hastens the disintegration of the worn-out tissues of the body, and facilitates the deposition of new tissue from healthy oxygenised blood; in short, it accelerates the processes of waste and repair, whose activity is essential to the vigour of all the organs and the healthful integrity and energy of all the functions. Thereby worn-out or morbid matter is removed, unhealthy fat absorbed, and the body is built up symmetrically with firm muscular fibre.

Exercise is attended, accordingly, with results which may be called organic or vital. As every contraction of the muscles contributes to the exhaustion of their vital properties, a constant stream of fresh arterial blood is directed towards them for their replenishment; and the more numerous the contractions and relaxations—in other words, the more vigorous the exercise of any set of muscles—the more rapidly and abundantly are they supplied with arterial blood. If the exercise be habitual, the result is seen in the increased volume, firmness, elasticity, and strength of the exercised muscles, as is well exemplified in the case of prize-fighters, from whose system of training many would do well to take a hint.

"The effect of exercise, in causing the waste of the active organs, is well illustrated by the comparative absence of waste when they are unemployed.* Inaction implies almost stagnation, and is always attended by diminution of the vital functions. This is exemplified in hybernating animals, which pass months in sleep without food, and almost without breathing; as well as in frogs found alive in stones and trees, where they must have been dormant for a great number of years. Inactive organs then require little nutrition, because there is little expenditure, and large supplies would be not only useless but injurious. On

* Dr. A. Combe's "Principles of Physiology."

the other hand, when any organ is active it attracts to itself an increased supply of nervous energy and blood. The former gives an increased tone and energy, in harmony with the greater call made on its powers: the latter repairs the waste of substances which action produces. *If the exercise is continued for a time and recurred to at regular intervals, a more active nutrition is established, a permanently greater supply of blood enters the vessels even during the intervals of inaction, and an increase of development takes place, attended with increased vigour of function.* All this is performed physiologically by a law expressed thus: 'Ubi stimulus; ibi fluxus.' Where the stimulus is, there flows the blood.

"If any part is not duly exercised, there is no local stimulus to attract a large supply of blood, or abundance of nervous power; there is no activity of nutrition, no perfection of development, and no vigour of function. The arms of a blacksmith, compared with those of a dancing-master, afford a familiar illustration of these two conditions. By this benevolent arrangement, fraught with important practical consequences, *parts acting strongly receive large supplies, and parts doing nothing are left in a state of weakness befitting the small demands made upon them.* All who understand these principles must behold as the height of folly for any one to expect great nutrition and great energy to follow inaction, and *vice versâ;* and yet this is what the ignorant of mankind daily look for.

"This law of exercise, as influencing nutrition and function, is universal in its application, and applies to the *osseous* [bony] as much as to any other system. If the bones are duly exercised, then an increased supply of blood is determined towards them—*active nutrition* goes on, and they acquire increased dimensions, strength, solidity, and firmness. If they are not exercised, the stimulus required for the supply of blood to them becomes imperfect. Imperfect nutrition takes place, and debility, softening and unfitness for their office, follow in the train."

Exercise, when of such a kind as to set the whole frame in motion, and bring all its parts alternately into activity, rouses to action the nervous centres, and has a tonic, stimulating, and beneficial influence on the entire system, physical and mental. If regularly attended to, it permanently exalts the nutritive functions, gives strength, agility, elasticity, and grace to the body, vivacity and buoyancy to the spirits, and secures a serenity, cheerfulness, and mental exhilaration which without it are altogether unattainable. No doubt a man may, by a rigidly abstemious diet, be enabled to lead a physically inactive life with exemption from actual disease, and may even thus attain to old age; but such a one can never experience that alacrity and exaltation of the animal spirits of which his nature is capable, and which makes the mere fact of *living* itself a perpetual enjoyment. He must of necessity have a languid circulation, small waste of materials, and correspondingly small demand for new supplies; hence, a low degree of vital power, weak digestion, feeble respiration, blood both ill-conditioned and ill-distributed, spirits flat, if not depressed. His life must be at best that of a spiritless valetudinarian—neither enjoying the world himself, nor, by habitual cheerfulness and serenity, promoting the enjoyment of others.

We must not, however, be supposed to countenance any overdoing of exercise, or to advocate exercises of a violent and exhausting kind, which induce a collapse of vital force beyond the power of the individual's habitual repose and nutrition to extricate him from. The over-exertion of one day may have such an effect on the nervous and muscular tissues, that weeks of repose may be required for them to recover their tone. How many healthy soldiers are invalided for a time after a long and forced march! In the case of the weak and diseased, over-exertion is still more injurious, aggravating all the symptoms of feebleness or uneasiness from which they suffer. It is, therefore, incumbent on every one to know what exercises suit his constitution

and habits, how far he should go, when he should stop, *qûid valeant humeri, quid ferre recusent*—what he can and what he cannot bear. Exercise should be pushed to the extent necessary to maintain the system in a healthy condition, and its functions perfect; all beyond this is to be deprecated.

At the same time, taking too little exercise is more common—at least, among certain important classes—than taking too much. It is also more mischievous and more fruitful of suffering; especially when combined with brain or stomach intemperance. But the golden mean should be kept in view in this, as in all things else. "*In medio tutissimus ibis*"—thou shalt journey most safely in the middle path.

As to the different kinds of exercise, they divide themselves into three classes—Active, Passive, and Mixed.

Active exercises are such as walking, leaping, dancing, fencing, rowing, and gymnastics. Each has its recommendations, and variety is necessary to the highest beneficial effects.

Walking is one of the most healthful modes of exercise, and the one most generally available. It exercises and develops the inferior extremities, at any rate, even when slow and formal; but when it expands into a smart walk or run, the arms and chest also are exercised. This latter style of walk is that fitted for healthy young people, who neither enjoy nor can be much benefited by a languid saunter. That should be confined to the aged, the weak, and the disabled. The beneficial results of walking or running exercises are greatly enhanced by the stimulus of joyous companionship, and of some exciting or interesting pursuit or sport.

"Hence the superiority, as exercises for the young, of social and inspiring games, which, by their joyous and even boisterous mirth, develop the necessary stimulus to set the muscles into energetic and varied action. Hence the entire inefficiency of the dull and

monotonous walk, which in many schools is made to supersede the natural, lively, and animated sports of youth. The playful gambols and frisking of all young animals teaches us that activity of mind and joyous exhilaration are designed, at least for youth, as the natural mainsprings and accompaniments of all healthy and inspiring muscular exercise; and that the confinement and inactivity of the body is the very reverse of that condition which should prepare the mind for the processes of cultivation and the acquirement of knowledge; and is calculated to inflict a permanent injury on those who are submitted to its restraints. The great superiority of active sports, botanical and geological excursions, gardening, turning, &c., as means of exercise, over mere monotonous movements, is referable to the same principle. Every kind of youthful play and mechanical operation interests and excites the mind as well as occupies the body; and by thus placing the muscles in the best position for wholesome and beneficial exertion, enables them to act without fatigue for a length of time, which, if occupied in mere walking for exercise, would utterly exhaust their powers. The elastic spring, bright eye, and cheerful glow of beings thus excited, form a perfect contrast to the spiritless aspect of the boarding-school processions, where the natural instincts of youth are disregarded, and the results in point of health and activity are not less different. So influential indeed is the nervous stimulus, that examples have occurred of strong mental emotions having instantaneously given life and vigour to paralytic limbs."

For the same reason, constitutional walks ought to be varied as much as possible, and combined with some object to be attained, *e.g.*, a visit to a friend, the sight of beautiful scenery, of a review or other public spectacle, or of some wonder of antiquity, art, or ingenuity. These make a wonderful difference in the value of the walk, as a tonic and stimulant to the system.

Leaping will, as a matter of course, always be in

favour with school-boys, and, when they do not carry it on too long, serve to give a wholesome impetus to their entire system. An occasional game at leap-frog would have a salutary effect on many of their seniors, if such a thing could be accomplished out of sight and hearing of Mrs. Grundy.

Dancing to the strains of animated music has the most salutary influence on all the vital functions of the body, and properly regulated is one of the most exhilarating and beneficial kinds of social enjoyment. No doubt abuses have connected themselves with this enjoyable and healthful exercise, but that is no justification for the absurd prejudice against it displayed in some quarters where it is denounced as purely an evil. Dancing has no *necessary* connection with intemperance, late hours, voluptuous excitement, or dissipation; but is, when properly regulated, as, for example, at some of the water cure establishments, as conducive to good feeling and sound morality as it is to health. It is certainly better that people should come together to dance to the enlivening strains of the piano or violin than that they should meet merely to feast and guzzle like the Aldermen of former days, or spend great part of their existence in moping melancholy through want of companionship, exercise, and relaxation. If there are improper places where dancing and music form the attractions offered, the best way to keep young people from these is to give them the benefit of these inspiriting and healthful influences, combined with time, place, and circumstances of an unexceptionable character. The best way to prevent a bushel being filled with chaff is to fill it with wheat.

In connection with dancing, vocal music deserves mention as a salutary exercise as well as source of enjoyment. In *Singing*, the lungs and muscles of the throat and chest are called into activity with great beneficial effect. The extended cultivation of this art amongst us—in our schools and seminaries—is a subject of great congratulation, encouraging the hope of im-

proved social feelings amongst all classes, and an increased diffusion of health, happiness, and virtue.

Fencing exercises the upper part of the body, and where it is combined with marching to exercise the lower limbs, and other *Military Exercises*, greatly conduces to agility, quickness of movement, and graceful carriage. Our volunteers, of all arms, are an instance of the improvement in health and general appearance which exercises of this class are competent to effect. If all students, brain-workers, and sedentary toilers of whatever class, were to become volunteers, or at least practise those exercises called for by military duty, we should hear less of broken health and untimely graves than unfortunately we do now.

Rowing is a capital exercise for the arms and chest; witness the development of our watermen in those regions of the body. It is pleasing to see the attention this manly exercise obtains at our famous universities, and to think of the prolonged health, life, and usefulness which will reward the amateur boatmen on the Isis and the Cam for their devotion to it. In these islands, with their extended seacoast and countless lakes and streams, there are ample facilities for practising rowing, and good digestion and sound sleep will be the prize of those who do so in due moderation.

Gymnastics are admirably adapted to develop and invigorate every part of the body, and are worthy of every one's attention. The more ambitious feats of the gymnasium, however, should be left to young, supple, healthy, and athletic aspirants, and even these should eschew too sudden and violent exertion, as thereby internal lesions may be produced, the air-cells of the lungs torn, and the foundation laid of cough, spitting of blood, and consumption. This much by way of caution. But of the great benefit accruing from gymnastic exercises prosecuted judiously there can be no doubt. Some admirable systems of gymnastic exercises have within the last few years been submitted to the public, particularly those of Watson, of New York, and

Dr. Dio Lewis, of Boston, U.S. The systems propounded by these gentlemen consist of graduated series of exercises with *wooden* apparatus—wands, dumb-bells, rings, and Indian clubs. Watson has also an admirable system of *calisthenics*, or exercises without apparatus, and of *phonetics*, or exercises for the voice and lungs. All these exercises are such as to give full play to every muscle in the body, together or alternately, and none of them are of that violent or exhausting character which might by possibility do injury.

In Watson's book appropriate music is given as an accompaniment to the exercises, intended to be performed by numbers in concert, and where this can be effected the mental stimulus will greatly enhance the beneficial effect.

The importance of this mental stimulus in all exercise cannot be exaggerated. The chief beneficial effects connected with bodily movements spring from the *mind*. The felon on the tread-wheel has bodily exercise enough, but does he derive the benefit from it that the school-boy does from running, laughing, and leaping, from cricket and football in the playground, or from a holiday spent in nutting or gathering berries in the wood? Exercise is comparatively valueless until the idea of taking it for health is quite forgotten in the interest and pleasure excited by the occasion. Whatever be the kind or description of movement set on foot, the more the mind enters into it with interest and delight, the more that spirit, vivacity, and cheerfulness accompany it, the more effective will it be in promoting the health of those participating.

Passive exercises, *e.g.*, *sailing* and *carriage exercise*, are so far beneficial to all that the exposure to the continually changing air, by increasing radiation and vaporisation, withdraws heat from the body, as does the action of a fan, and this creating a demand for more to be supplied by the action of the oxygen on the elements of nutrition, a quicker consumption of the ingested food takes place, the change of matter—a pro-

cess on whose activity health and strength depend—is accelerated, and appetite is increased.* But this kind of exercise of course does not call into play the muscles

* "The animal body is a heated mass, which bears the same relation to surrounding objects as any other heated mass. It receives heat when the surrounding objects are hotter, it loses heat when they are colder than itself.

"We know that the rapidity of cooling increases with the difference between the temperature of the heated body and that of the surrounding medium; that is, the colder the surrounding medium, the shorter the time required for the cooling of the heated body.

"How unequal, then, must be the loss of heat in a man at Palermo, where the external temperature is nearly equal to that of the body, and in the polar regions, where the external temperature is from 70° to 90° lower.

"Yet, notwithstanding this extremely unequal loss of heat, experience has shown that the blood of the inhabitant of the arctic circle has a temperature as high as that of the native of the south, who lives in so different a medium.

"This fact, when its true signification is perceived, proves that the heat given off to the surrounding medium is restored within the body with great rapidity. This compensation takes place more rapidly in winter than in summer, at the pole than at the equator.

"Now, in different climates the quantity of oxygen introduced into the system by respiration varies according to the temperature of the external air: the quantity of inspired oxygen increases with the loss of heat by external cooling, and the quantity of carbon or hydrogen necessary to combine with this oxygen must be increased in the same ratio.

"It is evident that the supply of the heat lost by cooling is effected by the mutual action of the elements of the food and the inspired oxygen, which combine together. To make use of a familiar, but not on that account a less just illustration, the animal body acts, in this respect, as a furnace, which we supply with fuel. It signifies nothing what intermediate forms food may assume, what changes it may undergo in the body, the last change is uniformly the conversion of its carbon into carbonic acid, and of its hydrogen into water; the unassimilated nitrogen of the food, along with the unburned or unoxidised carbon, is expelled in the urine or in the solid excrements. In order to keep up in the furnace a constant temperature, we must vary the supply of fuel according to the external atmosphere, that is, according to the supply of oxygen.

"In the animal body the food is the fuel: with a proper supply of oxygen we obtain the heat given out during its oxidation or combustion. In winter, when we take exercise in the cold atmosphere, and when consequently the amount of inspired oxygen increases, the necessity for food containing carbon and hydrogen increases in the same ratio; and by gratifying the appetite thus excited, we obtain the most efficient protection against the most piercing cold. A starving man is soon frozen to death; and every one knows that the animals of prey in the arctic regions far exceed in voracity those of the torrid zone."—*Liebig.*

of the body, and so cannot be compared, in point of beneficial effect, with active exertion in the open air. The easier the carriage and the smoother the road, the more placid the water through which the vessel glides, the less is the amount of stimulating exercise to the body, which, however, profits by the cooling process and the increased absorption of oxygen. Travelling in a springless cart over rough roads, or standing on a vessel's deck while she rolls and pitches in a gale, affords greater benefits to the strong, though the process in neither case is very agreeable. But of ordinary carriage or sailing exercise, all that can be said is, that for the above reasons it is a boon to the aged and feeble, that in all cases it is better than no exercise at all, and that it is made still better by being conjoined with a pleasant excursion or picnic along with cheerful and sociable companions.

Mixed exercises are such as *Riding on Horseback.* This exercise, combining the active and passive—the rapid transit through the air with the exercise of the muscles—is one of the most salutary and effective kinds of exercise which the sedentary can have recourse to. Its benefits are signally illustrated in its effect upon the consumptive. These have been known to ride twenty miles without stopping, to the great increase of their strength, when, but two weeks previously, on commencing equitation, they were not able to mount without help, and could ride only a little way. The inhalation of pure air, change of scene, and exercise of the muscles, wrought the improvement. If so salutary in the case of such a dreadful disease, how much more must it be effective in preserving the health of the healthy? Happy the individual, who, "free from care and strife," can command the services of a docile yet spirited charger! He need never want cheerful, exhilarating, health-inspiring exercise.

For horseback—and, indeed, all other active exercise—early morn is the best time, when the sun returns to illumine the landscape, when the breeze is fresh, and

the dew-drops sparkle in the morning rays. Then is the time to shake off the lethargy of slumber, to inhale the revivifying oxygen, to cheer the spirits by the sight of smiling fields, verdant woods and silvery streams, while the air resounds with the music of feathered songsters, and to lay up for the day a store of health, vivacity, and cheerfulness.

The instinctive love of action manifested by children shows how Nature has made it a condition of healthful existence. Action is to them as natural as breathing; deprived of the power to engage in it they droop and become delicate. To both girls and boys a great deal of exercise in the open air is necessary to the healthful and symmetrical development of their bodies, and for laying the foundation of a sound and vigorous constitution. Active sports and amusements should, therefore, be encouraged by all who have charge of the young. Systems of training and education which overlook the necessity of such physical culture are radically defective, and those guardians must have singularly morose and misanthropic souls who do not delight to hear the merry laugh and witness the agile motions of healthy young folks engaged in some active game on the greensward, whether in the bright sunlight or under the shade of some wide-spreading tree. If their clothes get soiled, or their complexions tanned, no matter so long as their limbs acquire activity, suppleness, and grace, and the bloom of health—best of all cosmetics—adorns their cheeks.

Old people also need exercise, and where they cannot afford a carriage, should walk abroad as much as their strength will allow, and sit in the open air, in porch or garden, as much as possible. They should also exercise the lungs by a hearty laugh as often as they have the chance, keep the mind occupied by engaging in lively conversation or reading, and so they will at least retard the advent of that "second childishness and mere oblivion" which clouds the last days of many who have neglected the laws of health.

CHAPTER IV.

DIET.

THE continual disintegration and waste which takes place in all parts of the body necessitate oft-renewed supplies of food. The greater the imbibition of oxygen through the lungs and the skin, and the more vigorous the exercise of the voluntary muscles, the more nutriment in the shape of food is required to maintain the body in health and strength. "Physiology," says Liebig, "has sufficiently decisive grounds for the opinion that every motion, every manifestation of force, is the result of a transformation of the structure or of its substance; that every conception, every mental affection, is followed by changes in the chemical nature of the secreted fluids; that every thought, every sensation, is accompanied by a change in the composition of the substance of the brain. In order to keep up the phenomena of life in animals certain matters are required, parts of organism, which we call nourishment. In consequence of a series of alterations, they serve either for the increase of the mass (*nutrition*), or for the supply of the matter consumed (*reproduction*), or, finally, for the production of force."

It has been already shown that animal heat as well as vital force is the product of food acted on by the oxygen of the atmosphere. By the combination of these a temperature is generated within the body higher than the average of that of the atmosphere, and this is necessary to the effectual carrying on of the vital processes. The food, then, must be of such a character as to maintain the normal temperature of the body while it affords the materials of growth, development, repair of waste, and muscular or nervous force. Accordingly, the best diet is that which accomplishes these ends in the degree required by the constitution, habits, and

circumstances of the individual. More heating food is required by the inhabitants of the polar regions than by those who live near the equator, and those who live in temperate climates require more in winter than in summer. More nourishing food is required where the materials of growth must be supplied as well as ordinary waste repaired, than where the latter process alone is active; also where there is great expenditure of muscular or nervous energy than where there is mental and corporeal stagnation and inactivity. To meet these several requirements Nature has provided for man a great variety of foods, in some of which the heating principle predominates, and the nutritious in others. As a general fact, it may be stated, that the non-nitrogenous or oily principles contained in food are the *heating*, and the nitrogenous, *i.e.* glutinous or plastic principles, the *nutritious*.* It would appear, however, that *some* heat is set free when the plastic or nitrogenous elements are decomposed, since carnivorous animals eating nothing but lean flesh have a high temperature

* "If we hold that the increase of mass in the animal body, the development of its organs, and the supply of waste,—that all this is dependent on the blood, that is, on the ingredients of the blood, then only those substances can properly be called nutritious or considered as food which are capable of conversion into blood. To determine, therefore, what substances are capable of affording nourishment, it is only necessary to ascertain the composition of the food, and to compare it with that of the ingredients of the blood.

"Two substances require especial consideration as the chief ingredients of the blood; one of these separates immediately from the blood when withdrawn from the circulation. It is well known that in this case blood coagulates, and separates into a yellowish liquid, the *serum* of the blood, and a gelatinous mass, which adheres to a rod or stick in soft, elastic fibres, when coagulating blood is briskly stirred. This is the *fibrine* of the blood, which is identical in all its properties with muscular fibre, when the latter is purified from all foreign matters.

"The second principal ingredient of the blood is contained in the serum, and gives to this liquid all the properties of the white of eggs, with which it is identical. When heated, it coagulates into a white elastic mass, and the coagulating substance is called *albumen*.

"Fibrine and albumen, the chief ingredients of blood, contain, in all, seven chemical elements, among which nitrogen, phosphorus, and sulphur are found. They contain also the earth of bones. The serum retains in solution sea salt and other salts of potash and soda, in which the acids are

within their bodies, and also that oily substances possess certain constructive elements, since cod-liver oil has been known to restore the wasted flesh of the consumptive. But, in whatever way these facts may be explained, the general principle, enunciated by Liebig, holds good, that the oily or fatty elements *heat*, and the glutinous or plastic elements *nourish* the body. Hence, the Esquimaux bear up against the cold of an Arctic winter by living upon oil and blubber, while the sun-burnt natives of India and China find rice, a starchy substance, evolving comparatively little heat, and that very gradually, amply sufficient to maintain the normal temperature of the body. Hence, also, the value of lean meat, the most plastic (nourishing) and least heating of all articles of food, to the hard-working man, since it enables him to bear the incessant strain attending muscular exertion without inconveniencing him with excess of combustible matter.

The non-nitrogenous or fatty and oleaginous substances used as food, serve, therefore, to *fortify the*

carbonic, phosphoric, and sulphuric acids. The globules of the blood contain fibrine and albumen, along with a red colouring matter, in which iron is a constant element. Besides these, the blood contains certain fatty bodies in small quantity, which differ from ordinary fats in several of their properties.

"Chemical analysis has led to the remarkable result, that fibrine and albumen contain the same organic elements united in the same proportion, so that two analyses, the one of fibrine and the other of albumen, do not differ more than two analyses of fibrine or two of albumen respectively do, in the composition of 100 parts.

"In these two ingredients of blood the particles are arranged in a different order, as is shown by the difference of their external properties; but in chemical composition, in the ultimate proportion of the organic elements, they are identical.

"This conclusion has lately been beautifully confirmed by a distinguished physiologist (Dénis), who has succeeded in converting fibrine into albumen, that is, in giving it the solubility, and coagulability by heat, which characterise the white of egg.

"Fibrine and albumen, besides having the same composition, agree also in this, that both dissolve in concentrated muriatic acid, yielding a solution of an intense purple colour. This solution, whether made with fibrine or albumen, has the very same re-actions with all substances yet tried.

"Both albumen and fibrine, in the process of nutrition, are capable of

system against cold, while the nitrogenous or glutinous and plastic substances *repair the waste of the tissues*, and *give strength to the muscles and nervous system*. The food of man ought then to be varied in accordance with the climate and the seasons, and with the degree of exertion, whether of brain or muscle, demanded of him. When exposed to severe cold, oily and fatty substances should form a not inconsiderable proportion of his diet; in hot climates these should be almost entirely eschewed, and the diet should consist chiefly of farinaceous substances and fruits, with a small proportion

being converted into muscular fibre, and muscular fibre is capable of being converted into blood. These facts have long been established by physiologists, and chemistry has merely proved that these metamorphoses can be accomplished under the influence of a certain force, without the aid of a third substance, or of its elements, and without the addition of any foreign element, or the separation of any element previously present in these substances.

"If we now compare the composition of all organised parts with that of fibrine and albumen, the following relations present themselves:—

"All parts of the animal body which have a decided shape, which form parts of organs, contain nitrogen. No part of an organ which possesses motion and life is destitute of nitrogen; all of them contain likewise carbon and the elements of water, the latter, however, in no case in the proportion to form water.

"The chief ingredients of the blood contain nearly 17 per cent. of nitrogen, and no part of an organ contains less than 17 per cent. of nitrogen.

"The most convincing experiments and observations have proved that the animal body is absolutely incapable of producing an elementary body such as carbon or nitrogen, out of substances which do not contain it; and it obviously follows, that all kinds of food fit for the production either of blood, or of cellular tissue, membranes, skin, hair, muscular fibre, &c., must contain a certain amount of nitrogen, because that element is essential to the composition of the above-named organs; because the organs cannot create it from the other elements presented to them; and, finally, because no nitrogen is absorbed from the atmosphere in the vital process.

"The substance of the brain and nerves contains a large quantity of albumen, and, in addition to this, two peculiar fatty acids, distinguished from other fats by containing phosphorus (phosphoric acid?). One of these contains nitrogen (Frémy).

"*Finally, water and common fat are those ingredients of the body which are destitute of nitrogen. Both are amorphous or unorganised, and only so far take part in the vital process as that their presence is required for the due performance of the vital functions. The inorganic constituents of the body are iron, lime, magnesia, common salt, and the alkalies.*"—*Liebig.*

of lean meat, fowl, game, fish, &c. In temperate climates, the diet should, on the same principle, be varied with the atmospheric conditions prevailing at each season of the year. Again, where there is little mental or physical exertion, and consequent slow disintegration of the organised structures, nourishing food should be taken sparingly; but active and energetic workers, whose exertions rapidly waste the substance of brain or muscle, require substantial meals of nourishing food to preserve the integrity of those structures, and the general health and vigour of their frames.

It is a debated question, whether man was designed to subsist on animal and vegetable substances combined, or on vegetable substances alone. There can be no doubt that man may, and often does, preserve vigorous health and attain to great longevity, feeding on vegetable substances only, and that graminivorous animals, as the ox and sheep, make good beef and mutton out of grass and turnips. In fact, every nutritious principle existing in flesh-meat is found in the direct products of the vegetable kingdom. It does at first sight appear remarkable that graminivorous animals should form blood, and hence, flesh, bones, &c., with the same facility as the carnivorous, whose nutriment is originally derived from blood itself; but chemical researches have shown that the parts of vegetables which afford nutriment to animals, are rich in nitrogen; especially is this the case with the different descriptions of grain, with pease, beans, and lentils, and with the roots and juices of what are commonly called vegetables. In these are found *vegetable fibrine, vegetable albumen,* and *vegetable caseine*:—

"These three nitrogenised compounds," says Liebig, "vegetable fibrine, albumen, and caseine, are the true nitrogenised constituents of the food of graminivorous animals; all other nitrogenised compounds, occurring in plants, are either rejected by animals, as in the case of the characteristic principles of poisonous and medicinal plants, or else they occur in the food in such very

small proportion, that they cannot possibly contribute to the increase of mass in the animal body.

"The chemical analysis of these three substances has led to the very interesting result that they contain the same organic elements, united in the same proportion by weight; and, what is still more remarkable, that they are identical in composition with the chief constituents of blood, animal fibrine, and albumen. They all three dissolve in concentrated muriatic acid with the same deep purple colour, and even in their physical characters, animal fibrine and albumen are in no respect different from vegetable fibrine and albumen. It is especially to be noticed, that by the phrase, identity of composition, we do not here imply mere similarity, but that even in regard to the presence and relative amount of sulphur, phosphorus, and phosphate of lime, no difference can be observed.

"How beautifully and how admirably simple, with the aid of these discoveries, appears the process of nutrition in animals, the formation of their organs, in which vitality chiefly resides! Those vegetable principles, which in animals are used to form blood, contain the chief constituents of blood, fibrine and albumen, ready formed, as far as regards their composition. All plants, besides, contain a certain quantity of iron, which re-appears in the colouring matter of the blood. Vegetable fibrine and animal fibrine, vegetable albumen and animal albumen, hardly differ, even in form; if these principles be wanting in the food, the nutrition of the animal is arrested; and when they are present, the graminivorous animal obtains in its food the very same principles on the presence of which the nutrition of the carnivora entirely depends.

"Vegetables produce in their organism the blood of all animals, for the carnivora, in consuming the blood and flesh of the graminivora, consume, strictly speaking, only the vegetable principles which have served for the nutrition of the latter. Vegetable fibrine and albumen take the same form in the stomach of the

graminivorous animal as animal fibrine and albumen do in that of the carnivorous animal."

So far then the "Vegetarians" have ground for insisting on the plausibility of their views in regard to the natural food of man. He *can* find ample nutriment in the vegetable kingdom alone. But in point of fact man is *omnivorous;* eating and thriving upon all kinds of food. Only let the plastic and combustible principles be duly proportioned in his diet, and he may with impunity be restricted to either animal food or vegetable, or may use a mixture of both. In the tropics he maintains health and vigour by feeding on rice, fruits, &c.; in temperate climates he does the same on a mixed diet of bread, meat, and garden produce; in the prairies of the New World he often thrives exclusively on buffalo beef and venison; and in the Arctic regions fish and seal oil yield him the requisite warmth and nourishment. Were it not so he could not adapt himself to diversities of climate and circumstances as he actually does. Moreover, in civilised and densely peopled countries, our own, for example, where population multiplies faster than the means of subsistence, the adoption of a mixed diet becomes a matter of necessity, since, with scientific farming, a much larger amount of food can be obtained from the soil in the form of beef, mutton, and grain, than could be obtained in the shape of grain alone. People must be fed though the most plausible theories should go to the wall. But, besides, the lean flesh of animals contains the elements of nutrition in a more concentrated form than does any vegetable substance. Thus by its use the brain or hand toiler can be sustained under continuous or special exertion without undue distension of the stomach, or an inconvenient amount of combustible ingesta. Lean meat promptly and easily repairs the waste caused by severe labour, and with our training and habits, it is not easy to see how it could be dispensed with, except perhaps in very hot weather. The hard-working man needs *meat* as the hard-working horse needs *grain.*

But the distinctive characteristic of the food of man is that it is *cooked.* Man alone is a *cooking* animal. By this process the character of his food is so modified as to preclude comparison with the food of the lower animals, and it is on the proper cooking of food that much of its suitability and wholesomeness depends. It is by this means alone that such a great variety of food as man consumes can be rendered compatible with his physiological properties and powers, and yield due nutriment to his system.

Our limits forbid us to enter into details respecting the properties of the different kinds of food, but we may say a few words about those in general use in connection with the best mode of cooking them. There is no more stimulating and nourishing article of diet than "the roast beef of Old England," and no better method of roasting it than by turning it round constantly before the fire, either by cradle-spit or jack, until it is well, but moderately, done through. Boiled beef is neither so stimulating nor so nourishing. The same remarks apply to mutton, which is deservedly a favourite among animal substances as an article of food. Stewed beef or mutton is not so wholesome as the roast or boiled, but the worst of all methods of cooking flesh is frying it in fat or grease of any kind. The fibre of the meat becomes thoroughly saturated with the hot fat, so that however well masticated, its particles cannot imbibe the saliva so essential to good digestion, consequently on entering the stomach they are prepared to resist the action of the gastric fluid, thus causing irritation and functional derangement, and tending to break down the digestive powers of the stomach. Where the gridiron can be brought into use, broiled meat is as nutritious as plain roasted or boiled; indeed, a delicate appetite will often prefer broiling to any other mode of cookery.

The flesh of the swine, whether fresh or salted, is only for strong people who work hard in the open air, and even they would be better with good beef or mutton.

Pork cannot indeed be dispensed with as an article of food in the present state of our population, but it should be eschewed by sedentary people, and by all whose stomachs are delicate, unless taken in the form of ham or bacon, and then rather as a relish than a meal.

Fowl and fish form important items in the list of available foods, and make an agreeable variety. They can often be partaken of freely when stronger meats are unsuitable. Fish are better when fresh than when salted, or salted and smoked. And the plainer the cooking the better for the stomach.

All greasy messes, whether made so with butter or fat, are highly indigestible, and should be avoided. Good sweet butter spread upon bread is nutritious; but hot melted butter is decidedly objectionable in all circumstances, on the grounds already stated when speaking of meats fried in fat.

Soups of all kinds made from animal substances are open to the objection that they hold in solution the nutrient principles of the flesh in a very concentrated form, and that when taken into the stomach the water of the soup is speedily absorbed, and so the concentrated nutriment is left drier than is even solid food which has been properly masticated and mixed with the saliva, and hence is less easily acted on by the gastric juice. The digestive organs are thereby irritated and debilitated. As a general principle it holds good that in proportion as artificial preparations of food render mastication unnecessary, they prove detrimental to the alimentary organs, and hence to the whole system. For this reason *mashed* potatoes are less wholesome than those eaten without that process, since the former are apt to be "bolted," or at least but imperfectly mixed with the saliva, while the latter must be chewed, and so are better prepared for the action of the gastric juice in the stomach.

Of other animal substances, cheese, milk, and eggs fall to be noticed. Cheese can be digested in moderate quantities by the active and laborious whose general

habits are simple and temperate. The rich old cheese supposed to be so admirable a promoter of digestion after a luxurious meal is not only digested with difficulty, but causes great irritation in the stomach. Cheese only a few months old, and possessing very little richness, is more wholesome and digestible than those kinds which are more highly prized for their quality and flavour. Milk has always been esteemed one of the most nourishing and wholesome articles of diet. It is the natural food of children and the young of all mammiferous animals, and is said to be the only article of diet containing within itself every element essential to the sustenance of the body. But to be wholesome it must be procured from healthy cows which in the grazing time roam at large in the open fields, and in winter are well housed and fed on good hay, with exercise in the open air every day. Cows kept confined in towns, without fresh air and exercise, and fed on artificial and improper food, cannot and do not yield wholesome milk. The adulterations of milk, too, have been so numerous and notorious as to become a standing subject of banter and jest. Of course such unwholesome or adulterated milk can be of little benefit to those unfortunately doomed to partake of it. Eggs are considered more highly animalised than milk, and are very nourishing when not difficult of digestion. But they should, for ordinary purposes, be boiled rather lightly than otherwise, and should always be fresh—stale eggs are certainly not agreeable, and they can hardly be wholesome.

Turning to the vegetable kingdom, *bread* claims our first attention. Good wholesome bread can be made from many of the farinaceous products of the vegetable kingdom,—oats, barley, Indian corn, rye, rice, and even tapioca, arrow-root, sago, pease, beans, chestnuts, millet, buckwheat, and potatoes, may be used as constituents of the "staff of life." But the bread-grain in this country is of course wheat, and wheaten bread is for the most part that in use where this volume will

find its way, except the *oaten cakes, barley bannocks,* and *potato scones* of the northern parts of Britain. In regard to wheaten bread, then, that in use ought of course to be made of pure wholesome flour, well baked, well raised, and not eaten new. But a most important fact in regard to wheaten bread is that the rage for having it white is the source of much evil. Bakers are tempted to use alum, sulphate of copper, chalk, pipe-clay, plaster of Paris, and other substances, to secure that whiteness so acceptable to many, and hence a great deal of the bread in use is of an unwholesome character. But even were the white bread, *i.e.*, bread made of superfine flour, perfectly free from adulteration, it has the fault of containing nutriment in a form too concentrated, and hence it is difficult of digestion, and gives rise to constipation and other derangements of the system. Far more wholesome and more easily digested is the coarse bread made from unbolted flour; for although the fine flour contains the nutrient quality, the branny part contains the digestive, which is quite as important. A great deal of evidence might be adduced in support of this assertion, but suffice it to say that the finer and whiter the bread, the more should it be avoided by those who value health, especially if great bread eaters. Those who eat little bread and much flesh, vegetables, and fruits, need not of course care so much whether the bread they eat be coarse or fine. Another fact to be noted is, that home-made bread, if prepared by competent hands, is greatly to be preferred to that supplied by the baker. One knows what is in it; it can be prepared leisurely and in the best way, and variety can be secured by the occasional mixture of other farinaceous substances with the wheaten flour used. But be this as it may, the utmost attention should be paid to the quality of the bread eaten. If we cannot have home-made bread, let us at least see that the baker who supplies us furnishes a wholesome article, and we need attach but small value to the mere whiteness of the loaf.

But bread is not the only form in which farinaceous substances can be used. They can almost all be converted into wholesome puddings with milk and sugar, and perhaps eggs, the general rule being that the less rich the more wholesome they will be, and that puddings should form part of the meal, and not superinduced on a sufficiency already taken. A plentiful use of the products of the kitchen garden—pease, potatoes, parsnips, turnips, &c.— along with animal food, is also to be recommended. Fruits in their seasons are most wholesome if good and ripe, but, as in the case of puddings, they should constitute part of the meal at which they are taken, not an addition to that which is enough.

In regard to all articles of diet, the necessities of the constitution, the seasons of the year, and the general habits of the individual, should be studied; everything partaken of should, if possible, be of the best quality, and while there should be little variety in what is eaten at a single meal, variety should be studied in the substances selected for meals from day to day. A varying of the component parts of breakfast or dinner throughout the week gives a zest to the food which materially aids digestion.

By way of indicating the comparative digestibility of various articles of diet, we give an extract from the well-known tables of Dr. Beaumont, who informs us that the following articles were digested in the times mentioned:—

	H.	M.
Rice, boiled soft	1	0
Apples, sweet and ripe	1	30
Sago, boiled	1	45
Tapioca, Barley, stale Bread, Cabbage, with Vinegar, raw; boiled Milk, and Bread and Milk, cold	2	0
Potatoes, roasted; and Parsnips, boiled	2	30
Baked Custard	2	45
Apple Dumpling	3	0
Bread-corn, baked; and Carrots, boiled	3	15
Potatoes and Turnips, boiled; Butter and Cheese	3	30

	H.	M.
Tripe and Pig's Feet	1	0
Venison, broiled	1	35
Codfish, boiled; and Eggs, raw	2	0
Turkey, Goose, and Lamb	2	30
Eggs, soft boiled; Beef and Mutton, roast or boiled; and Oysters, raw	3	0
Boiled Pork; stewed Oysters, Eggs, hard-boiled or fried	3	30
Domestic Fowls and Ducks, roasted	4	0
Wild Fowls; Pork, salted and boiled; Suet	4	30
Veal, roasted; Pork, and salted Beef	5	30

In regard to all descriptions of food, it is important to observe that it should not be eaten too hot, that it should be completely masticated and triturated in the mouth before it is swallowed, not leaving to the stomach the duties of the teeth; that it should be simple in its character, and *eaten in quantities commensurate with the wants of the system.* As a general rule, people can eat almost anything, provided the quantity taken be small, whereas even rigid vegetarians, by exceeding in quantity, may bring upon themselves serious consequences. Much more do they who eat to excess of rich, stimulating, and highly-seasoned food, and that not merely occasionally, but as a habit. Gout, rheumatism, dyspepsia, and a host of other maladies, are the natural fruit of such habits. These results are of necessity aggravated by a corresponding indulgence in alcoholic stimulants.

In regard to the number of meals, and times for taking them, we may observe, at the outset, that the sense of hunger is the natural index to the frequency of meals, as well as to the quantity required to be eaten; only, to be a true index, it must, so to speak, be a healthy hunger, not a morbid feeling induced by artificial habits and a long course of dietetic errors. To the regular recurrence of such feeling of hunger, a habit of taking meals at uniform times is essential, and these should neither be so far apart as to require an over-distention of the stomach when the meal is partaken of, in order to take in as much food as the

system requires, nor so near together as to prevent the complete disposal of one meal by the digestive organs before another is received into the gastric cavity. As a general rule, five or six hours should elapse between meals, and supposing three meals a day to be taken, the principle of allowing five or six hours to elapse between each meal is now generally prevalent. The mischief done by too frequent and too abundant meals is beyond all reckoning. Another mischief is late suppers, which not only cause disturbed sleep and frightful dreams, but tend seriously to impair the digestive functions. It is true that men in vigorous health may pursue this practice for many years with apparent impunity, but at last Nature presents her bill, and the constitution becomes bankrupt.

Regularity, moderation, not more than three meals a day, and an early and light supper, if any, these are the golden rules in regard to meals, if one would have a clear head, good digestion, sound sleep, and long life. If regularity be important in the case of adults, it is still more so in that of children. Their food must be digested as well as that of adults, and when they are stuffed with food at every hour of the day through mistaken fondness, or to keep them quiet, their delicate systems are disturbed, and the result is disease. The frightful infant mortality which prevails may well own this as the chief of its causes, next to improper kinds of food.* Children from the very first hour of life should be fed at stated and definite times, whatever the number of these may be in a day, and this once made a

* A valuable paper on the food of infants has been published by Mr. H. Turner, chemist, Manchester. He says:—"The best food for infants is undoubtedly that which Nature herself provides, viz., the child's own mother's milk; but sometimes mothers have no milk, or not sufficient for the child's nourishment, and in some cases it is expedient for other reasons that she should not nurse. In such cases it is usual to seek for a wet-nurse, who generally turns out a nuisance in the house, barely durable. If the nurse has lost *her own child* of nearly the same age as the one she is engaged to suckle, her health good, and all parties satisfied, then nothing can be said against the arrangement, but if her offspring is living, and if it has to be taken from her, and deprived

habit, no difficulty will be experienced in carrying out such regularity, and so preventing much evil and suffering. What is true of children is no less so of aged people, in regard to whose meals the most systematic regularity and punctuality ought always to be observed.

In connection with diet, the subject of drinks demands attention. As a rule, pure water is the best drink when the object is merely to satisfy thirst. It does this more effectually than any other beverage. It

of its own proper nourishment, an unnatural and cruel wrong is inflicted on the poor helpless and innocent sufferer; and if, as is often the case, the selected nurse is a mother but not a wife, the encouragement to immorality is so direct and positive, as to be shrunk from by all right minded persons, and vice is rewarded with a good home, good living, and little or no work. In other cases the infant is 'dry nursed,' or 'brought up by the hand,' that is, if it should not happen to be killed by the process, as is too often the case, and then of course it is not 'brought up' at all.

"That improper food is the cause of much infant mortality there cannot be a doubt, and if there were, it would be removed by a Report * lately printed and circulated by Drs. Whitehead and Merie, giving the results of their most careful and painstaking investigations into the causes of mortality and diseases among children. This report shows that more than 50 per cent. of children in Manchester die before they reach the age of five years, and of these by far the greater part die during the first year, the deaths being in the following relation to ages.

"Under 12 months, of 146 patients, 20 died, or 14 per cent. nearly.

"From 1 to 2 years, of 105 patients, 8 died, or 7½ per cent.

"From 2 to 3 years, of 65 patients, 4 died, or 6 per cent.

"From 3 to 4 years, of 53 patients, 2 died, or 4 per cent.

"Above the age of 4 years to the 13th, of 161 patients, no deaths had occurred.

"The same report shows that '70 per cent. of the deaths occurred from *abdominal diseases;* 72 per cent. were partly cases of deranged digestion, in most instances combined with diarrhœa, of either dietetic or atmospheric origin.' It also shows that the number of badly developed children amongst the 'hand-fed' was *six times as great* as amongst those fed with the milk of the breast alone. Here then we have an appalling amount of mortality, disease, and imperfect development, arising from errors in the diet of infants. The question is—*Can it be avoided?* And the reply—*It can.* How?

"If we examine the constituents of the human milk and compare

* "Children's Diseases:" First Report of the Clinical Hospital for Diseases of Children, Manchester, containing an account of the results of the first 520 patients treated by A. S. Merie, M.D., and J. Whitehead, M.D.

is not good to drink much at meals; better, if thirsty, to take a glass of water some fifteen minutes before the meal, and another when the process of digestion is somewhat advanced. Drinking a glass of water on rising in the morning is a salutary practice, and a good substitute for pills or other purgatives. The habit of drinking, as well as eating, at stated times is attended with good effects, and unless something unusual has happened, thirst at irregular periods will thus be prevented.

Drinks, however, are taken for other ends than the

them with those of the cow, we shall find that they differ considerably. The following table shows the composition of different kinds of milk, as given by Henry and Chevallier.

Constituents.	Milk of the				
	Woman.	Cow.	Goat.	Ewe.	Ass.
Caseine	1·52	4·48	4·02	4·50	1·82
Butter	3·55	3·13	3·32	4·20	0·11
Sugar of milk	6·50	4·77	5·28	5·00	6·08
Various salts	0·45	0·60	0·58	0·68	0·34
Water	87·98	87·02	86·80	85·62	91·65
	100·00	100·00	100·00	100·00	100·00

"From the above it will be seen that the milk of the cow differs from that of the woman, in this principally, that it contains less sugar of milk and more caseine. The excess of the latter may be got rid of by precipitating with rennet, but this is a very troublesome process, and is open to other objections which it is not needful to notice, as I am about to suggest a much simpler method of accomplishing the end.

"It is obvious that by diluting the milk with water, we can lessen the relative proportion of caseine, and by previously dissolving sugar of milk in boiling water in the proper proportions, and diluting fresh cow's milk with it, we accomplish the two objects of lessening the relative quantity of caseine, and increasing the relative quantity of sugar of milk at the same time. The following formula will give the results as nearly as is necessary for practical purposes, and it has the sanction of experience.

"Dissolve one ounce of sugar of milk in three-quarters of a pint of boiling water, and mix with an equal quantity of good fresh cow's milk;

quenching of thirst, and here we enter upon debatable ground. Should man use stimulating beverages, or should he not? Some reply to this question in the negative, and denounce all stimulating beverages as simply injurious; others maintain their utility under certain conditions. We cannot enter at length into this question, and must content ourselves with a few general remarks.

Under the head of stimulating drinks are included not only wine, beer, spirits, and every alcoholic fluid, but the narcotic tea and coffee. All these are used extensively by mankind, showing that there exists in man a natural love of stimulation. But as in many individual instances stimulating drinks are entirely dispensed with, and good health maintained notwithstanding, it is evident that stimulating beverages are not essential to man's physiological well-being. Then there can be no question about the enormous mischief done by alcoholic stimulants used to excess, which is very often the case; nor that even tea and coffee, if too much indulged in, tend to injure the nervous system.

Where, then, this abstinence can be made a habit, and no uneasiness or depression attends it, nor yet diminution of mental or corporeal strength, it is no doubt the safest course, and worthy of a trial by all who seek perfect health. There can be no doubt that many have

let the infant be fed with this from the feeding bottle in the usual way. Always wash the bottle after feeding, and put the teat into cold water, and let it remain until wanted again.

"The water in which the sugar of milk is dissolved should be thoroughly boiled to ensure its complete solution, and also to expel the air, which might cause flatulence.

"If the child requires to be suckled in the night, a little of the prepared milk may be warmed in a pipkin by means of a spirit-lamp. The occasional addition of a little fresh cream to the above food will be beneficial to the child.

"I have had one of my own children fed as above from birth, and the results were all that could be wished. I have also recommended it in many other cases, and it has always been carried out with satisfaction.

"The Sugar of Milk mentioned above can be procured from any of the homœopathic chemists."

found by personal experience that they could undergo more bodily and mental fatigue when drinking no draught but the crystal lymph than they could do when using wine, beer, spirits, and whatever else in the way of beverage was deemed generous and nourishing.

On the other hand, no one can look at the positions in which man is placed in civilised countries such as ours, at the habits which have been engendered from infancy amongst the population, at the great variety of constitution and states of health amongst individuals, and at the wear and tear of mind and body so universal amid the struggles and competition characteristic of *go-ahead* communities, without seeing that stimulants must be resorted to by many, in spite of everything which can be said against them. And amid this endless variety of circumstances and contingencies in which we are placed, and the sudden prostrations of mind or body to which we are liable, to say that tea, coffee, wine, beer, and spirits are only injurious, and never of service, would be to contradict an experience almost universal from the Deluge to our own time.

We would say, then, that stimulants being used, as undoubtedly they will continue to be, the weaker only should be so habitually, and always in moderation. The stronger should be reserved for emergencies.

Tea, coffee, &c., have with our habits become necessaries of life, and (though sedentary people, by using them to excess without a corresponding amount of solid food and of exercise, do themselves great harm) are to almost all grateful and refreshing beverages. Only let them not be taken too strong or too hot, nor out of proportion to the food and exercise taken. Where they are found to disturb the nervous system, they should be at once abandoned for some grateful yet harmless beverage.

The habitual use of ardent spirits is altogether to be deprecated, even by non-teetotalers. When used, it should be in some emergency, when they may serve a

temporary purpose, but there the use of them should cease.

There is, and can be, no valid objection against the moderate use of pure or light wines, nor yet against wholesome beers. They do not tempt to excess, and they refresh and exhilarate. Brandied wines are open to the same objections as ardent spirits in a rather less degree. They should be used but sparingly.

It should always be remembered that the only source of permanent strength to the body is *food* digested and assimilated, and that all pure stimulants, such as have now been referred to, increase the vital action so as to cause an expenditure of vitality in excess of the immediate replenishment, hence the *reaction* following their use. The extra exertion made under their influence has been made at the expense of the constitution, and if this is frequently repeated, permanent debility must follow. Caution and moderation, then, ought always to characterise the use made of them, and they should never be made a substitute for solid, nourishing food.

The injurious results flowing from the use of narcotic and stimulatiug beverages are signally aggravated by the adulterations practised in regard to them. Wine, beer, spirits, &c., are "doctored" to such an extent as in many cases to render them mere slow poisons. He who would drink pure wholesome wine or beer must be at some pains to procure it. The amount of trash sold under the name of wine is appalling; in some cases there is not a drop of the juice of the grape in the filthy compound. When we advocate the *permissive* use of stimulating drinks, we mean pure beverages which are what they profess to be. All others should be eschewed with the utmost care. As to tea and coffee, there is not now much difficulty in procuring a good and genuine article.

A word as to the use and abuse of tobacco, no longer a vexed question, any more than the use of tea and coffee, those "*slow poisons*" of which so much was written, *pro* and *con*, when the present century was

first looming in the distance, by the "Sir Sapients" of that day. We are taught that "every creature is good, and nothing to be refused if it be received with thanksgiving." Philosophy confirms this teaching in proving that Nature never works without a beneficent purpose, and that those creatures, both animal and vegetable, which possess within themselves the greatest power of reproduction are specially intended for the use of man. In our imperfect knowledge, as a matter of course, we may not be able to account for the peculiar uses of some; but, from analogy, we come to the conclusion that as in the vegetable world cereals, and fish of all kinds among animals, are the most productive, they are specially devoted to man's use. To whatever clime tobacco, one of the most productive of plants,* has penetrated, whether as seed to be cultivated or as dried leaf to be consumed, there tobacco-smoking has taken firm hold. The relish for narcotics is inborn, and the consentient opinion of the civilised world, no less than that of savage life in the wilderness, proclaims that "where Nature gives a strong tendency there must be a strong reason for the cause, and still more so when she superadds a pleasure. Hence to rail at the use of tobacco is simply to join in a parrot cry, *vox et præterea nihil*, an idle attempt to rehabilitate the *Counterblaste to Tobacco* of that pedant, King James, which has long been consigned to 'the tomb of all the Capulets.'" Narcotics, used in moderation, are among the creatures which are good to be received with thanksgiving, let the *Jeamses* say what they will to the contrary.

Dr. Gallagher, for fourteen years a naval surgeon, says emphatically, "the use of tobacco in the navy has done no harm, but much good." Dr. Christison, of Edinburgh, our highest medical authority on poisons, dismisses the question of tobacco being "a slow poison," by asserting that "no well-authenticated ill effects

* Linnæus counted 40,320 seeds in a single pod of *Nicotiana tabacum*, the tobacco chiefly cultivated in France and Germany.

have been shown to result from the habitual practice of smoking;" and to this testimony Dr. Ranking, of Norwich, adds, "I have had ample opportunities of seeing the effects of smoking in all degrees; from one pipe a day, like my own, to the practice of hourly fumigation, even in bed. The result of this experience is the conviction that tobacco, like tea, is only pernicious in its abuse, and that, used temperately, it is harmless, and may under circumstances be salutary." What these circumstances are Dr. Hassell's book "On the Adulteration of Food" shall explain:—"In persons whose circulation is brisk, and who have an abundance of red blood—in other words, in the sanguine and plethoric, or when the functions of digestion and assimilation are active—we should say that this habit, when not indulged in to excess, would be calculated to be productive of beneficial rather than injurious consequences." Further on Dr. Hassell says, "There is a class of persons on whom tobacco-smoking, practised in moderation, may possibly exert a beneficial effect—namely, those of nervous and irritable temperament, especially those who are so from the over-excitement of business, rather than from disease; and this applies to a considerable number of residents in large towns and cities." Other circumstances, where the use of tobacco may prove beneficial, are stated by Dr. Bucknal, Physician to the Devon County Lunatic Asylum, who laughs at the notion of tobacco having any influence on the production of insanity. "It is far more likely to prevent it," he says, "by blunting the keen edge of bodily distress and mental grief, and consequently the moderate use of tobacco is advantageous in the treatment of insanity;" an opinion endorsed by the late Dr. Conolly, who was in the habit of ordering a pipe to be given to restless insane patients in the middle of the night, stating that there was "not the least foundation for the theory that tobacco either causes or predisposes mental disease."

The late Dr. Marshall Hall, whose opinion is at

variance with the above, was no smoker himself, and is hardly entitled to be ranked as an authority on the subject. "I've analysed it, I've tasted it, and I know it," was not his canon. He had the happy knack of getting up the experiences of others, and promulgating them *ex cathedrâ*. The following is a case in point; but as a warning against the habit of tobacco-smoking it is valueless. "My First Cigar" is a thing not easily forgotten. Its result is generally a feeling very much akin to sea-sickness, only greatly intensified. This case referred to by Dr. Hall was probably nothing more. The extract is taken from the *Edinburgh Medical and Surgical Journal*, in 1816:—"Mr. J. H., aged nineteen, unaccustomed, except for a day or two before, to the effects of tobacco, smoked one and a part of a second pipe. He became affected by violent syncope, and by violent retching and vomiting. He returned home, complained of pain in the head, undressed himself, and went to bed. Soon afterwards he was taken with stupor and laborious breathing. He was found in that state by the medical attendant. The countenance was suffused with a deep livid colour; the eyes lost their brilliancy; the conjunctivæ were injected; the right pupil was exceedingly contracted; the left was much larger than usual, and had lost its circular form; both were unaffected on the approach of light. The hands were joined, and in a state of rigid contraction; the arms bound over the chest; and the whole body was affected with spasmodic contractions; the breathing was very stertorous. From these several symptoms we may pretty accurately judge of what is going on in the brain in solitary smokers, and in a minor degree in all smokers."

To any one who is a smoker the *reductio ad absurdum* in the last paragraph will be sure to evoke a smile at the gross ignorance it displays, and yet this is the bugbear which is frequently put forward to deter young men from the use of tobacco, though they see all their companions, who have once cut away the invisible

strings that bound them, finding evident enjoyment when indulging in a smoke. For the very young, the habit is no doubt baneful, as it is said to check growth, but all that an adult has to fear from the moderate use of tobacco is probably nothing more than the discoloration of his teeth.

Bacon, Locke, Newton; Milton, Addison, Byron; Warburton, Parr, and Palmerston, several of them inveterate, but all smokers of fair average, have placed on record full and sufficient evidence that it is not the moderate use, but the silly abuse of tobacco which is alone injurious to man. As a warning against this abuse we again quote Dr. Marshall Hall:—"When I first occupied my present lodgings, I was struck with the almost constant appearance of a young man, obviously of fortune or independence, who walked up and down on the opposite side of the road, half-way between my window and the sea. He was tall, robustly made, but stooped, and his whole gait and appearance were slow, slouching, and inanimate. I could not imagine what should induce a fine young man so to occupy himself, or rather to pass hour after hour sauntering up and down without occupation. At length the mystery was solved. I observed, what I had not discovered at first, that the youth *had* an occupation; between his hand and his lips he constantly held a *pipe*." Such constant smoking would bring about the same result as constant eating or constant drinking, by gradually sapping the nervous energies both of mind and body.

CHAPTER V.

CLOTHING.

It has already been shown that animal heat is generated within the body by the action of the oxygen of the air upon the elements of the food. The body acts, in this

respect, as a furnace which we supply with fuel, and in order to keep this furnace at a uniform temperature the supply of fuel must vary with the degree of cold or heat in the surrounding atmosphere. The more the body is cooled the more food is required, because the heat lost by the cooling process must be restored from within by the combustive process above referred to.

The use of clothing arrests this cooling process. To quote Professor Liebig :—

"Our clothing is merely an equivalent for a certain amount of food. The more warmly we are clothed the less urgent becomes the appetite for food, because the loss of heat by cooling, and, consequently, the amount of heat to be supplied by the food, is diminished.

"If we were to go naked like certain savage tribes, or were exposed in our avocations to the same degree of cold as the Samoyedes, we should be able with ease to consume 10 lbs. of flesh, and perhaps a dozen of tallow candles into the bargain, daily, as warmly-clad travellers have related with astonishment of these people. We should also be able to take train oil without bad effects, its carbon and hydrogen only sufficing to maintain the equilibrium of our bodies with the external temperature."

The reason, then, why clothing keeps us warm is that it arrests the radiation of heat from our bodies, and it does this in proportion to its non-conducting power; eider down, which is the best non-conductor, makes the warmest garment. The advantages of clothing are, that it diminishes the necessity for food, saves labour to the heat-making organs, and to a certain extent supersedes the necessity for active exertion to keep the body duly warm. On the other hand, as the amount of vital force depends on the cooling of the body and consequent increase of appetite, digestive power, assimilation, and nutrition, clothing—in proportion to its warmth—diminishes health and strength. The ancient Britons, who went naked, and the Scottish Highlanders, whose lower extremities are uncovered, illustrate the bracing

and strengthening effects of exposure to a cold atmosphere; while many a "coddled" individual amongst us in this age of luxury and refinement illustrates the debilitating effects of enclosure in a casement of artificial warmth. There can be no doubt that the *costume* of the Ancient Britons tended to preserve the skin in a healthy and vigorous state, so that it performed all its functions more completely (see chapter on Bathing), to promote the circulation by continually attracting the blood to the surface, to enhance the freedom, fulness, and perfection of the respiratory process, and the development, symmetry, physiological power, and functions of the whole body. Very different men in constitution and muscular strength were they from those who now-a-days indulge in warm clothing, carpeted rooms, soft beds, and the like, and neglect to use means to brace and invigorate the system, whose powers of reaction under cold are reduced to a minimum. Clothing may be called an evil, in so far as it prevents the pure air from coming in contact with the body, relaxes and weakens the skin, checks circulation and respiration, and impedes voluntary motion. Nevertheless, as clothing is absolutely necessary, it is expedient to endeavour to ascertain how to regulate it so as to secure as much good and do as little harm as possible.

It would be absurd to insist on a uniform system of clothing amid the variations of our atmosphere—not to speak of the different degrees of susceptibility to cold to be found amongst different individuals. To dress in an invariable way in all cases would be to court colds, catarrhs, and rheumatism; every one should consult his own sensations, and put on such kind and amount of clothing as will protect his body effectually from an abiding sense of cold, even in the slightest degree. But then it would be wise and conducive to comfort to take all means to bring the body into such a state of vigorous health as to render a very moderate amount of clothing sufficient to preserve the body in proper warmth. This is to be effected by exercise in the open air, bathing,

and avoidance of close, heated apartments. The warmth which many maintain in their apartments tends greatly to reduce the power and tone of the frame, and to render it highly susceptible to cold; besides, such apartments not being properly ventilated, the same air is breathed over and over again, and as it is also rarefied, and so contains a diminished proportion of oxygen, the effect on the general health is most deleterious. While, however, insisting on the desirability of individuals endeavouring to make themselves as hardy as possible, it is necessary to put in a caution against their attempting to clothe in a style which the degree of hardiness they have attained to does not warrant. This error would be worse than the first. On no account should the necessity of feeling comfortable be lost sight of; if this feeling can be attained with light clothing so much the better, as has been already shown, but at all events it must be attained. Feel comfortable—with light clothing if you can—but, at any rate, feel comfortable.

The materials used as clothing should as far as possible be such as will least relax and debilitate the skin, and through it the whole body. This renders the use of flannel next the skin objectionable, except in the case of delicate invalids, and of those, who having begun to wear it, cannot leave it off. Better to have next the skin a garment of cotton, linen, or silk, and to secure whatever extra warmth is really required by a top-coat or other outer covering. This plan, too, has the advantage of capability of adaptation to the frequent changes of our climate—when the thermometer falls the outer covering can be put on, and put off again on the temperature rising.

Clothing should be as loose as possible, so as to admit of the free access of air to the body, and perfect freedom of respiration, circulation, and voluntary action. We are familiar with the accounts of the miseries endured by our soldiers from leather stocks and tight-fitting garments, and with the horrors of tight lacing in the case of women. All kinds of tight ligatures or

compressions should be discarded, especially in the case of the young and growing, whose bodies should be left free scope for development. Classical sculpture shows us how a loose and easy style of dress tends to develop and give symmetry and beauty to the frame.

Respecting local clothing there is a good old adage, "Keep the head cool and the feet warm." The way to do this is evidently to have warm clothing on the feet, and clothing less warm about the head and upper parts of the person. The parts most warmly clad have most blood drawn into the capillaries permeating their surface. Blood drawn to the feet is not likely to do mischief, but drawn to the head, neck, throat, &c., may produce congestion, and lead to serious consequences. Yet it is not uncommon to see in stage-coach, steam-boat, or railway-train, persons apparently stout and well who on a cold day will complacently wrap the neck in fur and the chest and shoulders in plaid or rug, with a view to make themselves comfortable and secure against catching cold. Yet these upper parts are best able to resist the cold, and if habitually exposed to it, no danger can result from the practice. But by clothing them to excess, not only is a tendency to congestion engendered, but extreme sensitiveness and liability to cold on the slightest exposure. It is to this cause that diseases of the throat, larynx, and bronchial tubes are often to be traced, and even lung disease may be induced by the habit of now wrapping up in the fashion described, and anon casting off the extra covering and exposing the parts to the cold air. This inequality of clothing is more dangerous than complete and habitual exposure of the parts so treated. By this treatment of the neck, shoulders, and chest, many of the fair sex irreparably injure their health.

In regulating the amount of clothing used, each individual should have regard to his organic capabilities—what is too much for one may be even too little for another. And while, as has been said, every one should clothe so as to feel comfortable, there is a call

for energetic endeavours to improve the general health when the quantity of clothing necessary to comfort is excessive. The strong, whose appetite is good and whose bodies are well filled with blood, need little clothing comparatively; and this is the condition all should strive to attain to. Of course aged people and those in hopeless chronic disease cannot follow out this suggestion, and must clothe in accordance with the necessities of their systems.

The clothing of children should be loose and easy, so as to give the utmost freedom to all the movements of the body. While, moreover, it is desirable to give them a hardy training, care should be taken that no part of the body is unduly exposed to cold; especially should this be attended to in the case of the puny and feeble, who would be killed by injudicious attempts to make them hardy.

CHAPTER VI.

BATHING.

It would be difficult to exaggerate the importance of bathing as a means of preserving health. Bathing is one of the most ancient customs, and in the East attained long ago the rank of a religious observance. The reader is no doubt familiar with the code of instructions given by the Jewish lawgiver in regard to ablutions, and Mohammedanism is not less strict in enjoining personal cleanliness upon its votaries. It is a matter of regret that Christian nations have too much overlooked the importance of the bath, and still more that this oversight has not been confined to the poor and uneducated.

"A want of personal cleanliness," says Dr. Guy, "is more frequently chargeable against persons of education than might at first sight be expected. The

practice of daily ablution of the whole body is observed by a comparatively small number of persons, but it is one which ought to be insisted on as an excellent tonic, as tending to guard the body against catching cold, and as keeping the skin in a proper state for the performance of its functions. The occasional use of the warm bath to ensure a more perfect cleansing of the skin is also to be recommended. The practice of daily ablution with cold water, followed by friction with a rough towel, or hair gloves, or the flesh brush, is often of the greatest benefit to those who have an hereditary predisposition to consumption, or who have already manifested a tendency to that disease."

The importance of bathing will appear when the functions of the skin are considered. These are greater than most people suppose.

In Mr. Erasmus Wilson's "Practical Treatise on the Skin," he says, "I counted the perspiratory pores on the palm of the hand, and found 3,528 in a square inch, each pore being the aperture of a tube a quarter of an inch long; it follows that in every square inch of skin there exists a length of tube equal to 882 inches, or 73½ feet. Surely such an amount of drainage as 73 feet in every square inch of skin, assuming this to be the average for the whole body, is something wonderful, and the thought naturally intrudes itself—what if this drainage were obstructed? Could we need a stronger argument for enforcing the necessity of attention to the skin? In estimating the length of the perspiratory tubes in the whole body, 2,800 pores might be taken as a fair average to the inch, and 700 inches of tube the whole length. Now the number of inches of surface in a man of ordinary height and bulk is about 2,500, the number of pores therefore 7,000,000; the length of perspiratory tube 1,750,000 inches, or 145,883 feet, 48,600 yards, or nearly 28 miles. This is only a specimen of the extraordinary structure. Besides the perspiratory vessels the skin is provided with vessels for secreting an oily substance, which is

of a very different nature in different parts of the body; with vessels to repair abrasion and provide for growth and carry off its decayed parts; with nerves and blood-vessels, that are probably as numerous as the perspiratory tubes. It must, at the same time, be remembered that the interior skin, or mucous membrane, is of a similar structure with the exterior skin, and is provided with equally numerous and complicated vessels to answer some analogous purpose. The whole of the wonderful system may be deranged, and its functions suspended or destroyed, through neglect of frequent ablution; inattention to its requirements seldom failing to produce disease."

To maintain a healthy condition of skin, not only must there be frequent change and washing of clothes, but regular bathing or washing of the surface of the body in order to remove adhering impurities, which, if allowed to remain, would obstruct its pores and impede its functions. The consequence of this must, in the great majority of cases, be impaired general health.

So far back as 1816, Dr. Clarke, the celebrated traveller, who had seen the good effects of bathing in the North of Europe, used the following language:—

"Eminent physicians have endeavoured to draw the attention of the English Government to the importance of public baths, and of countenancing their use by every aid of example and encouragement. While we wonder at their prevalence among the Eastern and Northern nations, may we not lament that they are so little known in our own country? We might perhaps find reason to allow that erysipelas, surfeit, rheumatism, colds, and many other evils, especially cutaneous and nervous disorders, would be alleviated, if not prevented, by a proper attention to bathing. The inhabitants of countries where the bath is constantly used have recourse to it in the full confidence of being able to remove such complaints; and they are rarely disappointed. In England, baths are considered only as articles of luxury. Yet, throughout the vast empire

of Russia, through Finland, Lapland, Sweden, and Norway, there is no cottage so poor, no hut so destitute, but it possesses its vapour bath; whither all the family resort, every Saturday at least, and every day in case of sickness.

"If some patriotic individual would endeavour to establish throughout Great Britain the use of warm and vapour baths, the inconvenience of our climate might be done away. Perhaps at a future period donations for public baths may become as frequent as the voluntary subscriptions whereby hospitals are maintained; a grateful people may commemorate the service they have rendered to society by annual contributions for their support. But when we recollect that the illustrious Bacon in vain lamented the disuse of baths, we have little reason to indulge the expectation. At the same time an additional testimony to their salutary effects, in affording longevity and vigorous health to a people otherwise liable to mortal diseases, from their rigorous climate and unwholesome diet, may conduce towards their introduction."

Happily public baths are not now the rarity in Great Britain that they were in the days of Dr. Clarke. Baths and wash-houses have been established in all our large towns; and though we should like to see the number of them increased, there is now little difficulty in obtaining any description of bath in the metropolis and other large cities of our country. In reference to the different kinds of baths and their effects on the system we would say a few words—we mean the vapour, hot-air, warm, tepid, cold, shower, and swimming baths, &c., &c.

The vapour and hot-air baths, so much in use on the Continent, are the most agreeable and effectual means of removing the impurities and exciting the action of the skin; they open the pores, so facilitating exhalation, and bring the blood to the surface, so promoting and equalising the circulation. Anything more agreeable and refreshing than a well-administered

vapour bath it is not easy to imagine. Some may experience a little uneasiness during the steaming process, but a cold wet cloth placed on the head and an occasional sip of cold water will in most cases dissipate this feeling. After some fifteen minutes' steaming, a tepid or cold bath succeeds, which is in the process exceedingly grateful, and followed by an exhilaration and cheerfulness which must be experienced to be appreciated. Prior to taking the tepid or cold bath, the body should be well soaped all over. Some do this while being steamed in the vapour box, which plan answers very well, as thereby no time is lost in getting out of the hot steam into the tepid or cold water, and the suddenness of the transition is the source of the agreeable sensations experienced.

This last statement will not surprise so many now as it would have done some years ago; for of late a good deal has been done to enlighten the public as to the true principles of bathing. Formerly it was supposed that the body must be cooled before plunging into cold water, than which there could not be a greater mistake. The effects of this kind of bathing have often been seen at the sea-side in the pale and livid looks and chattering teeth of those who have practised it, who, had they gone into the water "hissing hot," kept in active motion while immersed, and come out the moment they felt they had enough, would have felt a pleasant glow all over their frames, and looked ruddy, bright, and cheerful. A feeling of uneasiness and ailing is sure to follow from cold bathing when the body is chilled; that chill of the body allows, while it lasts, no one to benefit by a cold bath; but if exhausted with fatigue and want of support, *then*, indeed, whether the body be hot or cold, the cold bath is dangerous, because the vital power is at a low ebb, and not able to answer the demand made upon it by the sudden shock caused by contact with the water. There is no power of *reaction;* the blood driven from the surface to the interior does not rebound, owing to the absence of the requisite

force within. Internal congestion is the consequence, with some one of the many evils which follow in its train. A person who has been so unfortunate as to be dangerously chilled in this way should at once take active exercise, or a vapour or hot-air bath, to restore the equilibrium of the circulation. But in bathing, say two or three hours after a meal, *not sooner*, and with the body full of vigour and reactive power, a glow of warmth should be felt all over ere plunging into the cold water, or even taking a cold shower bath within doors. The great secret of comfortable and beneficial bathing is the securing of good reaction. That is impossible if a cold bath be taken while the body is chilled, or even cool, or when the system is low through exertion or fasting. But let the system be in its normal state of vigour, the stomach not full, yet neither empty, then the hotter the body is before plunging into cold water the better. This requisite heat and unexhausted state of the system are present when one takes a cold shower or plunge immediately on jumping out of bed in the morning. It may be secured by a smart walk or run before the morning, or afternoon dip at the sea-side, but decidedly the heat got up in the body by the vapour or hot-air bath is that which renders a cold bath the greatest of luxuries and secures the most glowing reaction. It has the advantage over the heat of the bed in the morning in that it is much greater, and over the heat generated by exercise in that no demand has been made on the physical energies, the bather being quite passive during the heating process, so that the two grand conditions of an enjoyable and salutary cold bath, viz., heat and an unexhausted system, are present when the bather emerges from hot steam or air, and plunges hissing hot into the cold wave.

We have thought it expedient to discuss this important point at the beginning of our remarks on bathing, or rather, baths, so that it may be borne in mind by the reader in perusing what is after-

wards said on the different baths he has it in his power to employ.

To return to the vapour bath. It can easily be extemporised in private dwellings by the bather seating himself on a chair under which is placed a vessel containing a sufficiency of boiling water, when, being wrapped and well tucked in a blanket or mackintosh enveloping chair and all, the steam is raised by inserting hot bricks, fire-balls, or pieces of iron, and speedily finds it way around his entire person. If he feel too hot, the blanket can be raised, and the steam let out. But an apparatus can be obtained at small cost, in the form of spirit-lamp and boiler, which can be placed under the chair, and give either hot air or steam, as may be desired. When only hot air is wanted, the boiler is removed. Thus, with little trouble or expense, one can have a vapour or hot-air bath in his own apartment.

The hot-air bath has been familiarised amongst us under the name of the Turkish bath, though in point of fact it dates from very remote antiquity. It was employed by the Romans long ere the Turks were heard of, and was used daily by the Roman legionaries, who have left the remains of their hot-air baths scattered over Britain, Germany, France, and Switzerland. The Romans appear to have borrowed it from the Greeks, as did also the Arabs and Turks on their conquest of the Eastern Empire. In the West it had been forgotten, and to Mr. Urquhart, the Eastern traveller, we are indebted for its revival in this country after it had been in abeyance for some fourteen centuries.

Unfortunately for the reputation of the Turkish, Roman, or hot-air bath, it became the rage shortly after its successful introduction into this country by Mr. Urquhart. The demand naturally led to extraordinary efforts to supply, and Turkish baths sprung up in all directions. But the majority were utterly unfit for bathing purposes. They were "ill-

constructed, ill-ventilated, and worse lighted." Those who conducted them were quite inexperienced, and their services failed to give satisfaction. Hence the tide of public feeling turned quite against the bath, and now only a few remain (in the metropolis) of those which were started in the first outburst of enthusiasm. Now, however, the bath is much better understood, and those in existence in our large towns are generally of a suitable character, and under good management. One of the best in this country, and probably in any other, is that in Jermyn Street, London, known as the "Hammam," and built, we believe, under the superintendence of Mr. Urquhart himself. Having used it ourselves, we can testify to the admirable adaptation of the building for the purpose contemplated, to the efficiency of the attendants, and the completeness and satisfactory character of all the arrangements.

Turkish baths have been attached to several of our infirmaries and lunatic asylums, and the most gratifying reports have been made in regard to their effects in alleviating or curing the maladies of the inmates. It is, however, with the bath as a means of preserving health that we have at present to do. That its influence in this respect is great we do not hesitate to maintain. The sweating process frees the body of the waste and effete matter which is so apt to be retained in the systems of those who lead sedentary lives, and is so prolific a cause of their maladies, relieves all the organs of excretion, and conduces to a general clearance of whatever interferes with the perfect activity and efficiency of the vital processes. The shampooing constitutes an excellent substitute for exercise, the soaping and washing with hot water perfects the cleansing of the skin, and the final ablutions close up the pores, brace the nerves, and fix the blood in the surface. The result is a feeling of lightness and elasticity of mind and body scarcely otherwise attainable—certainly not by the pent-up denizens of large towns—an increase of appetite and

power of digestion, and a sense of general physical well-being most gratifying to experience.

The Turkish bath is not weakening. The perspiration has removed none of the healthy substance of the body; only the refuse matter, which, if retained, would clog and embarrass the system. There is no danger of catching cold after it; for the final ablutions are with cold water (and most grateful it is if one be in tolerable health), which shuts the pores and puts an end to perspiration; so that there can be no danger of cold, through its being "checked" by the cold air when one issues from the bath into the street. In fact, the use of the bath fortifies against the sensation of cold to an astonishing degree, and one ceases to wonder how the Russians can rush out of their hot steam-baths and roll themselves in the snow. In a few cases it may produce unpleasant head symptoms, but these are obviated by avoiding the very hottest rooms and having one or two *sousings* with tepid water during the perspiratory process. Novitiates ought not to use the liberties taken by veteran bathers, some of whom are perfect salamanders, and can hardly get a temperature high enough to please them. They will betake themselves to the hottest room immediately on entering the bath. Caution is required at first, but it is seldom that any inconvenience is felt after two or three baths have been taken.

The processes of the bath are so generally known that a very short description of them will suffice. The bather is introduced into a light, airy apartment, called the Frigidarium, or cooling room, which is furnished with couches and mirrors. Here he undresses, and is equipped by the attendant in an appropriate bathing costume. He is then conducted to the Tepidarium, or warm room, whose temperature is about 128°, where he reclines on a couch, or marble slab (covered), until perspiration breaks forth. If a novitiate, he will probably content himself with the sweating to be obtained in this room, but, if a "Companion of the Bath," he will pro-

ceed to the Calidarium, or hot room, where he will find a temperature of from 140° to 170°. There he will perspire to his heart's content. At the "Hammam," however, there are higher temperatures—one room is kept at 180°, and that called the Radiating Chamber at over 200°. Only the salamanders essay these high temperatures. After the sweating process the bather is taken in hand by the shampooer, who puts him through the usual manipulations, which are quite pleasant to undergo when the man knows his business, as all the "Hammam" shampooers do. Thereafter the bather is conducted to the Lavatorium, or washing-room, where he is well lathered with soap, then soused with warm water, and, finally, subjected to the cold bath, be it douche, needle, spray, or plunge bath. A dry, warm sheet is then thrown around him, and he is reconducted to the cooling-room, where he reclines on his couch enveloped in this primitive costume until it is time to dress and revisit the outer world, thankful that he has had an hour or two's obliviousness of its cares and troubles.

All who are chained to the desk, the counter, or the workshop—all who live by the sweat of their brain, not their brow—all who lead sedentary lives, whatever their calling or sex (there are hours for ladies), should have a Turkish bath at least once a week to keep themselves in health and enable them to enjoy the comfort of a thoroughly clean skin. It is an admirable substitute for exercise, and, if universally resorted to, would do more to preserve the health of city populations than any or all of the sanitary measures devised for their benefit.

Warm-water baths have now been extensively provided for the public, and, when properly used, promote health and cleanliness. The warm bath has a soothing effect on the nervous system, and is exceedingly grateful after a day's fatigue and worry. Taken frequently, however, it is relaxing and debilitating, and this effect of it should be obviated by taking a cold shower-bath

after a good wash in the warm water; or, if this cannot be obtained, by causing the attendant, after a while, to let in cold water, so that, finally, the bath shall be at least a tepid one. This will tend to undo the relaxing effect of the warm water, and, by closing the pores of the skin, prevent the danger of catching cold afterwards. But we repeat that persons in health should not take warm baths without taking the cold shower afterwards, and should not remain in the warm medium too long, but take the cold shower while the body is well heated. They will find their reward in the reaction which will follow, and in impunity from colds.

The tepid bath does admirable service where the cold bath would be unsuitable; that is, in the case of the bloodless, feeble, and aged. It may range from 70° to 85°. The best time to take it is the forenoon, when the vital force is at its highest. All who find the cold bath too much for them, should have recourse to this bath, the frequent use of which will be found exceedingly beneficial.

The shower-bath, whether cold or tepid, is a most suitable bath on getting out of bed, and in some cases, also, before going to bed at night. It is very invigorating, and the more so the colder the water is, provided no unpleasant chill attends or succeeds the operation.

The cold bath is the best of all tonics. Its first effect is to drive the blood from the surface to the interior, and, where there is good reactive power, an immediate rebound takes place. The blood rushes again from the interior to the surface with increased volume and impetuosity. This is the cause of the *glow* which is felt after a cold bath judiciously taken. By the cold bath the nerves are braced, the vital processes accelerated, the change of matter—source of all vitality and strength—promoted, the spirits enlivened, and, indeed, the whole being so refreshed and invigorated, as to make the bather feel, as it were, a new man. We are here supposing that the conditions already laid down as essential to a successful cold bath have been duly attended to.

These conditions being observed, the swimming-bath is the best form of the cold immersion, combining the benefits of exercise with those of cold bathing.* The exercise of swimming, by keeping up the heat of the body, enables the bather to remain longer in the water than would otherwise be safe or profitable. The more the body is exercised while in the water the better. No splashing about, however, is equal to the exercise of swimming, and hence all who would enjoy bathing in

* In connection with swimming, Dr. **Marshall Hall's** directions for the treatment of the apparently drowned are worthy of attention :—

1. Treat the patient *instantly, on the spot, in the open air, exposing* the face and chest to the *breeze* (except in severe weather).

I.—*To clear the Throat—*

2. Place the patient gently on the face, with one *wrist* under the forehead ; [*all fluids and the tongue then fall forwards, leaving the entrance to the windpipe* FREE.]

If there be breathing—wait and *watch ;* if not, or if it *fail,*—

II.—*To Excite Respiration—*

3. Turn the patient well and *instantly* on his side, and—

4. Excite the nostrils, the throat, &c., and dash cold water on the face previously rubbed warm.

If there be no success, *lose not a moment,* but *instantly—*

III.—*To Imitate Respiration—*

5. Replace the patient on his face, *raising* and supporting the chest *well* on a folded coat or other article of dress ;

6. Turn the body very *gently on the side and a little beyond,* and then *briskly* on the face, alternately ; repeating these measures deliberately, efficiently, perseveringly, *fifteen* times in the minute, occasionally *varying* the *side;* [*when the patient reposes on the chest, this cavity is compressed by the weight of the body, and expiration takes place ; when he is turned on the side, this pressure is removed, and inspiration occurs.*]

7. When the *prone* position is resumed, *make* equable but efficient *pressure,* with brisk movement, *along* the back of the *chest ; removing* it immediately before rotation on the side ; [*the first measure augments the expiration, the second commences inspiration*]. The result is—RESPIRATION ;—and, if not too late,—LIFE !

IV.—*To induce Circulation and Warmth—*

8. Meantime rub the limbs *upwards,* with *firm grasping pressure* and with *energy,* using handkerchiefs, &c. ; [*by this measure the blood is propelled along the veins towards the heart*].

9. Let the limbs be thus warmed and dried, and then clothed, each bystander supplying a coat, a waistcoat, &c.

10. *Avoid the continuous warm bath, and the position on or inclined to the back.*

rivers or the sea, should learn to swim. Without this aid it is not safe to remain in the cold water above a very few minutes; but with it the stream or ocean-billows may be buffeted with safety for half an hour—at least, in warm summer weather. Swimming is taught to the youth of both sexes at Paris, in the baths which stud the channel of the Seine, and perhaps there is nothing in that famous capital more worthy our imitation. It is, indeed, pleasant to see so many swimming-baths already established in our large cities, and to know that at most of them lessons are given in the art of swimming. Such institutions are worthy of all encouragement, and it is to be hoped they will continue to be multiplied. But undoubtedly, when one has acquired the art of swimming, the best place to exercise it is the sea. There is something in the air and sunshine of the sea-side, in the restless heaving of the billows, and in the general surroundings of a watering-place, that makes sea-bathing unusually attractive and beneficial. Swimming, too, is easier in salt water than in fresh, the density resisting the pressure of the body to a considerable extent; and the saline ingredients exert a stimulating and wholesome effect upon the skin. If the benefits of fresh air and sea-bathing be not counteracted by improper habits of living, nothing can give the citizen a better "fillip" than a change of a few weeks from the town to the sea-side.

After all cold bathing, no matter in what circumstances, care should be taken to secure reaction by friction and rubbing with dry cloths and by active exercise. The neglect of this has often brought the cold bath into unmerited disrepute. Without good reaction, we repeat, the cold bath is injurious. But if the precautions we have indicated be taken to secure reaction, no one habit can be compared with cold bathing, including swimming, as a means of preserving the health and vigour of the body. Let it be repeated, however, that no bath should be taken sooner than two or three hours after meals.

Bath-rooms are now more common than formerly in the dwellings of the more affluent classes, and it is exceedingly desirable that every private dwelling should have conveniences for bathing, so that every member of the family shall have easy access from the sleeping-room to the bath. The expense bears no proportion to the comfort and benefit to health which would accrue from such an arrangement. A small apartment would suffice, and the apparatus whereby a cold, warm, tepid, shower, vapour, or lamp bath could be obtained, exceedingly simple. A small additional outlay devoted to those means of preserving health which science has made plain, would result in a vast accession of happiness to the community at large.

Where no such bathing conveniences are provided, he who would add bathing to the other means employed for preserving health need not despair. Let him make the best of circumstances, and "tub" in his own apartment—that is, procure a wide, shallow bath and a large sponge, and on rising get into the few inches of water in his bath, first sitting, then standing, and by means of the sponge "souse" the whole body with the cold water, then rub well with a dry coarse cloth, thereafter with the flesh-brush or hair-gloves. The luxury of this process at all seasons of the year is very great. Pure, soft water should always be employed, and a good soaping all over will add to the sanitary benefits of the morning bath.

Where no bathing conveniences can be had but those pertaining to the wash-stand, a good morning refresher can be had by means of two coarse towels. Let the bather make one of these as wet as it can be without dripping, and beginning at the back of the neck, pass briskly over the body and limbs, re-dipping the towel and repeating the operation until a comfortable feeling of having had enough supervenes; then let him take the dry towel, and rub all over vigorously until every part of the body is thoroughly dried. The flesh-brush or hair-gloves should then come into

play, with which every part of the skin should be well exercised. In warm weather the window should be thrown open during this process, and if the bather knows anything of calisthenics or gymnastics, now is the time to have a spell at those invigorating exercises.

Were this mode of morning bathing universally practised, we should hear less of dyspepsia and sluggish and constipated bowels, especially if the towel bath were accompanied by a draught of pure cold water where there is a tendency to these maladies. To all the comfort of the process and its beneficial effects during the entire day would be very great. Rising from one's bed in the morning, heavy, dull, and languid, such a process makes "Richard himself again." Once it becomes a habit, the morning towel bath and exercise will not be omitted on any consideration, so great is the difference it makes for the whole day in regard to the feeling of well-being, both of body and mind. As it is quite easily accomplished in almost any circumstances, and perfectly safe in all weathers, no one who does not bathe in more scientific fashion should allow himself to neglect it.

CHAPTER VII.

REST AND SLEEP.

In treating of rest and sleep, the distinction betwixt organic and animal life must be kept in view. By organic life is meant the life of the substances of the body, the processes connected with which go on in animals as in plants. In the human body the vegetative processes are presided over by the nerves called ganglionic, or sympathetic, in contradistinction to the cerebro-spinal system—composed of the brain and spinal cord—which presides over the operations of the animal life. Under the term animal life are comprehended all

the phenomena which result from the action of the will —all voluntary effort, whether of body or mind.

In organic life there is no interruption of function. The heart never ceases to drive the blood through the body, nor the lungs to respire; nor does the substance of the body cease to waste and to be replenished from the materials supplied by the digestive apparatus. But all this goes on in health without our consciousness, except that owing to the food necessary for the maintenance of organic life being separated from animals, the sensations of hunger and thirst compel attention from the voluntary powers, in order to furnish a new supply. Again, the functions of the organic life are perfect from the dawn of existence; they do not grow and expand, as do those of the animal life; and as they know no interruption, so neither do they, any more than those of plants, know fatigue. They have, therefore, no need of rest, *i.e.*, sleep. Death would result from their momentary slumber.

But the organs and functions of animal life cannot act continuously. The voluntary muscles cannot continue their action beyond a given time. While they are in activity, contraction must alternate with relaxation; but this alternation is not enough, they must have periods of complete rest. So with the organs of sense. By protracted effort the sensibility of the ear to sound, of the eye to light, of the tongue to savour, of the touch to the quality of bodies offering resistance externally, gradually cease. Nor can the brain carry on its intellectual operations nor work out its trains of ideas beyond a certain point. It must have its periods of repose. This repose is obtained by sleep, which steeps the senses in forgetfulness while it gives rest to the voluntary muscles. Sleep is to the animal life what food is to the organic. Sleep is as necessary to the continuance of sensation, thought, and muscular activity, as food is to make the blood which builds up and nourishes the body. As has been already shown, every thought, sensation, and motion involves destruction of some form

of tissue, and although the nutritive processes are continually at work repairing the waste thus occasioned, they cannot keep pace with the expenditure of organised substance caused by the exercise of the organs in the domain of animal life, and hence the absolute necessity of regular periods of rest for the latter. For this provision has been made in the wise economy of Nature, in rendering the organs and functions of organic life, whose continual activity is essential to our bodily existence, so entirely independent of those of animal life, that these latter may for hours be hushed in death-like slumber without the action of the former being in the least interfered with.

Sleep steals over our senses to give repose to the organs of animal life, and to give the vital powers an opportunity to repair the exhaustion and waste consequent upon voluntary exertion. When the system is in a perfectly healthy state sleep is a complete suspension of all the powers of animal life; the senses—the medium of our intercourse with the external world—are completely locked up, the busy brain is lulled to entire repose; not the slightest consciousness of existence remains. This perfect sleep refreshes and renews the whole man; it is "kind Nature's sweet restorer," the companion of health, and the almost sure guarantee of longevity.

Such perfect sleep is prevented in many instances by removable causes. When a course of dietetic errors, or other voluntary interference with and transgression of the laws of organic life, has induced physiological depression or oppression of the body and irritated the nervous system, broken and disturbed sleep is the result. All have heard of, and some have experienced the horrors of nightmare, with its "Gorgons, and Hydras, and Chimeras dire," and know that these are traceable to late, hearty, indigestible suppers. Nothing would more contribute to sound, unbroken sleep than attention to the dietetic rules laid down in an earlier page of this volume.

Worthy of more sympathy than the gourmands who impair the integrity of their slumbers by devotion to the pleasures of the table, are those whose sleep is disturbed by morbid irritability caused by over-action of the brain through the labours of a literary or professional life, or the cares of business. The continued action of the mind on some particular subject, so as to produce great exhaustion and weariness, will induce a morbid irritation in the domain of organic life which will cause the sleep to be dreamy and unrefreshing.

"Uneasy lies the head that wears a crown."

Sometimes this intense and protracted mental exertion cannot be avoided; but it is a pity it should not stop short of inducing a morbid condition of the viscera, and of organic life generally. Did it do so, mental exertion, instead of being a cause of disturbed sleep, would ensure a sleep, dreamless, profound, and refreshing.

Every attention should be paid to the securing of natural and profound sleep by all who value health and longevity. A mere sluggish drowsiness long continued relaxes the solids, impairs the organic functions, and induces general languor and stupidity; while excessive wakefulness debilitates the brain and the whole system. Careful dietetic habits, and a mind kept as easy and tranquil as possible, are the means to be employed to secure sound sleep. But valuable aids may be found in the sitz-bath taken for five minutes before going to bed, or in the envelopment of the head in a wet towel, when the brain has been overwrought and worried. These appliances require perhaps a little self-denial on the part of those who have recourse to them; but they are efficacious, and, above all, safe, being attended by none of the deleterious effects of the sleeping draughts sometimes had recourse to.

From these sleeping potions children often suffer grievously. Anything more to be deprecated than the practice of administering opiates to children to stupefy

them to sleep, we cannot imagine. If fretful, the kind and quality of their food, whether mother's milk or aught else, should be carefully looked into, and everything tending to irritate their delicate systems removed from it. No artificial means should be employed to lull infants to sleep,—even cradle-rocking is far better omitted; let them be kept scrupulously clean, comfortably but loosely clad, have pure, unirritating food, and they will sleep well without artificial appliances. The same methods will secure sound sleep to aged people, who require a less amount of it than the young or middle-aged, but at the same time require what they do have to be sound and refreshing. This it may always be made by the use of natural and proper means.

Night is the time for sleep. The pallid looks of those who turn night into day attest the truth of this. Some hold that it matters not when we sleep, if the proper number of hours be given to repose. But Nature and all experience teach us that they that sleep should sleep in the night. It has also been said that one hour's sleep before midnight is worth two hours after it, and undoubtedly those who get a good sleep before midnight are, as a general rule, the most healthy and long-lived. "Early to bed and early to rise, makes a man healthy, wealthy, and wise," says the proverb; there is one, too, which recommends us to "rise with the lark and go to bed with the lamb." Doubtless sound doctrine is conveyed in these adages—the fruit of experience and observation. As a general rule, therefore, subject, perhaps, to individual exceptions, people should carry the said doctrine into practice. In cities this is not very easily done; but even in them all who can should be in bed by ten or eleven at night, and get up by eight at latest in the morning. It is desirable to avoid the extremes of too little and too much sleep. Too little shortens life, by unduly drawing upon the vital energies to sustain the animal and sensorial powers and functions. Too much induces sluggishness and stupidity. If a general rule as to the amount of sleep

necessary for healthy adults were to be laid down, perhaps an average of seven hours out of the twenty-four is as near the mark as possible. Children should be allowed to sleep about as long as they please. It will now be proper to say something of bedding and bed-rooms.

Bedding and Bed-rooms.—It is not the softest and warmest bed that is the most wholesome, or the most conducive to strength and activity throughout the day. We have heard soldiers of the light infantry say that they felt most fit for their active duties when they had slept the preceding evening on a hard wooden bench. But be this as it may, there can be no doubt that down and feather beds ought to be discarded. They are soft, no doubt, and warm, feathers being bad conductors of heat, but what are their physiological effects? They are unquestionably relaxing and debilitating through the excessive heat they maintain around the body during sleep. This leads to the necessity of warmer clothing during the day, and the system is thereby still further weakened. Feather beds, then, with their concomitants, are a fruitful cause of dyspepsia and pulmonary diseases, through the effeminacy of constitution they engender, which makes the individual tremblingly alive to the effects of east winds and any sudden fall of temperature. Moreover, as the skin is constantly exhaling vapour loaded with excrementitious matters, feather beds being con-conductors, retain this vapour about the body, which is thus, while in bed, surrounded with an impure, as well as heated, atmosphere, both unhealthy and unpleasant to the senses. Unwholesome gases and offensive odours, too, arise from the decomposing animal matter present to some extent in every feather bed. It becomes thus almost impossible to keep a bed-room sweet and wholesome which has a feather bed in it. On every account, then, feather beds should be discarded, and mattresses, stuffed with hair thoroughly cleansed, or with straw or some kindred substance, used instead. It may be

objected to these that they are hard; but when a person comes to feel a soft bed a necessity, he is in a very indifferent physiological condition, and the sooner he gets out of it the better. Hard beds are favourable to bodily development, symmetry, strength, and activity, and consequently to clearness of head and cheerfulness of spirits. Custom, too, renders the hard bed more pleasant and conducive to sound rest than the soft luxurious one can ever be.

On entering in the morning a bed-room which has been occupied during the night, and is as yet unventilated, one is conscious, especially if just come in from the external air, of breathing a close, stifling, and offensive atmosphere. This arises from the impurities which have emanated from the skin and lungs of the sleeper of the previous night. These pollute the air of the room and saturate the bed clothes. How necessary, then, to throw open the bed-room window on leaving the room after dressing, taking up the clothes and throwing them over the backs of chairs, so as to be completely exposed to the draught of air from the windows!* In regard to bed-clothes, the same principle which has been laid down in reference to clothing is applicable to them; they should be as light as is consistent with comfort. Superfluity of heat around the body by night or by day is enervating, and tends to diminish health and abbreviate life.

Bed-rooms should always have a fireplace to aid ventilation, and should be subjected to frequent and thorough cleanings, so as to keep them permanently sweet and wholesome, and the bed-clothes should be frequently changed. On retiring to rest the occupant should leave a little bit of the window open, taking care not to expose himself to a *direct* current of air. Everything worn during the day should be thrown off, and the under-clothing hung up exposed to the air. The bed-garment should be loose and flowing, without ligatures or compression. One of linen or cotton is best.

* See chapter on Air, Light, and Ventilation, p. 19.

The conditions of a wholesome bed and bed-room should be especially attended to in nurseries. These, well-ordered, will save many a doctor's bill. As children are more delicate and susceptible than adults, non-sanitary arrangements in their sleeping-rooms tell upon them with twofold injurious effect. Their bed-rooms should, therefore, be kept carefully ventilated, and everything about their beds exceedingly clean. Feather beds should have no place in the nursery; far better that children should be trained to sleep on straw mattresses, which will tend to the development, vigour, and symmetry of their bodies; and if so trained they will never desire a softer couch,—a good thing for them. Moreover, too many children should not be made to sleep in one room,—at all events, care should be taken that every sleeper has a sufficiency of pure air.

As, after the meridian of life, the older people get they become less able to shake off deleterious influences, the bed-rooms of the aged should be conspicuous for their sanitary arrangements. Every condition of health should in their case be carefully attended to.

It is a great mistake to construct bed-rooms very small. They should be as large and airy as possible. Those who sleep in a small bed-room communicating with the sitting-room should leave the door between the apartments open during the night, and admit air by the window of the sitting-room.

CHAPTER VIII.

MENTAL DISCIPLINE.

By mental discipline, we here mean the exercise of the will in regulating the efforts of the intellect and the play of the emotions, so as to promote a healthy

condition of all the organs and functions of organic life, as explained in the preceding chapter. "I have always," says Lord Lytton, "had a great belief in the power of Will. What a man determines to do, that, in ninety-nine times out of the hundred, I hold that he succeeds in doing."

The functions of organic life, as has been stated, are presided over by the ganglionic system of nerves, these not being directly under the influence of the will. The body is built up and sustained, and the stomach, liver, and heart perform their parts in the process independent of the will, only the will acts as guardian of their interests. Thus, though the food taken into the stomach is, when once there, beyond the will's control, the will has the office of presiding over the selection, chewing, and swallowing it, which office it ought to discharge in accordance with the interests of the stomach. Again, though the function of respiration is properly an involuntary one, the will can render important aid in promoting its efficiency for purposes of health and preventing it from becoming the medium of injury to the body. The will can control this function to a certain extent in speaking and singing, which exercises have in ordinary health a beneficial influence, but sometimes they might injure, and the will can then prevent their being engaged in. The will can suspend respiration altogether for a short time when the exercise of it would be dangerous or impossible; *e.g.*, when the body is for the moment surrounded by a poisonous atmosphere, or when it is under water. The will, moreover, can make respiration the medium of increased health by dictating a simple "change of air," or by substituting a pure and wholesome for a deleterious atmosphere, or by accelerating breathing by active exercise. Nevertheless the function of respiration goes on day and night, independent of the will, as do digestion, absorption, secretion, and all the processes of the organic or vegetative life.

The will then, though acting the part of a sentinel

watching over the safety of the organic functions, has, strictly speaking, no direct control over them. While life remains they go on, *nolens, volens*. Yet, indirectly, the will can and does powerfully affect the nerves and functions of organic life. It does this through the direction it gives to the operations of the intellect and the exercise of the emotions.

The ordinary, calm operations of the mind have, it is true, little influence on the nerves of organic life, yet they have at least this negative good effect, that when the mind is quietly occupied and interested, *ennui* and other injurious mental states are prevented. But further, there can be no doubt that, since every function of mind and body was given us to be exercised, intellectual culture and occupation are favourable to the general health, provided they are moderately pursued. While, however, the due exercise of every function must needs have a salutary effect on the whole system, the law of exercise, that long-continued and sustained action exhausts the vital powers of an organ, holds good in reference to the brain as well as any other. Hence, when the brain is exhausted by intense and protracted study, a morbid irritability ensues, which is propagated by sympathy to the nerves of organic life, and all the functions under the control of those nerves become more or less disturbed. The intimate sympathy betwixt the stomach and the brain is a physiological fact, with which every one is acquainted; and through the stomach chiefly are the other organs and functions affected by mental influences. Nor is this all; the disturbance thus created in the domain of organic life reacts upon the brain, and so brain and viscera go on, acting and reacting upon each other until the entire health breaks down; digestion is performed with difficulty, mental exertion becomes impossible, and very frequently death steps in to close the scene. Many instances of this unhappy result of over-exerting the intellect might be cited from the experience of those familiar with our schools and universities.

Hence the value of the passage quoted from Cicero *de Senectute*, in the preface, to which our English proverb, "Old young, and old long," answers.

The moral from all this is the old familiar one, *in medio tutissimus ibis*, — "moderation in all things." Circumstances may no doubt call for a brief period of intellectual effort, which if made continuous would ultimately destroy life. They who must face such a crisis should see to it that a sufficient period of repose and recreation succeed the extraordinary effort. It is far better, however, when the necessity for such efforts can be obviated by the regular and due proportioning of study and muscular exercise, so that the body shall be kept continually in good health, and the mind vigorous and unclouded. This course is not only most conducive to the comfort and enjoyment of life, but, what the ambitious student will probably deem of more importance, is best fitted to enable him to get through the greatest amount of intellectual labour compatible with continued existence, without which, of course, intellectual acquirements and performances are worthless to the individual. As was said by an eminent professor, who himself fell a victim to over-exertion of the intellect, "a living dog is better than a dead lion."

Let every intellectual toiler therefore summon up a strong *will*, and adopt a rational method of study or brain-labour, which will preserve the health of the body, while it enriches the mind or fills the purse. Let him learn to quit the study or the desk at due intervals, according to age and circumstances, to walk or ride, to row, to swim, play at cricket, or engage in military exercises as a volunteer, by which last exercise he will "kill two birds with one stone," for he will both preserve his health and qualify himself to serve his country.

The will has a more difficult task to perform in attempting to control the emotions of the mind—care, anxiety, grief, anger, fear, love, joy, and so on; yet

such control is of the last importance to the general weal of the system. All mental excitements vehemently disturb the organic functions; and when sudden or violent, convulsively accelerate or retard them, so that sometimes sudden death is the result. Though they may fall short of producing such a catastrophe all at once, their frequent repetition induces and establishes permanently a morbid sympathy and irritability throughout the whole system, the brain being especially involved. The result is functional aberration and derangement, and, ultimately, organic disease. When this bodily condition has been established, the reflex influence on the mind causes a state of chronic discontent and desponding, everything appears in the darkest aspect, imaginary evils flit continually before the mental vision, and gloomy apprehensions for the future haunt the unfortunate sufferer. Such is often the result of indulging grief for losses, brooding in an angry spirit over insults and injuries, or in a melancholy spirit over disappointed love or ambition, or in a fearful spirit over the prospect of future poverty and destitution, or of allowing the ordinary vicissitudes of life to keep the mind in a continual state of gnawing, cankering care, which will admit of no mental repose, let alone hilarious recreation. It is neither possible nor desirable for man to divest himself of his emotions and passions, which have all their uses in the economy of life. Nor is it always possible to withstand their sudden tumultuous mutiny. A man receives a letter or telegram informing him that his beloved wife and child have been killed by an accident on the railway, and he is prostrated with grief. Another receives an abusive and insulting communication, and he is in a violent state of anger. A third hears that the population of the town in which he lives is being decimated by pestilence, and he has a paroxysm of fear. A young lady is informed that her betrothed has proved false and married another, and she faints through the sudden pang of disappointment.

All have heard of the old Greek who died of sudden joy on hearing that his two sons had been victors in the Olympic Games. These contingencies place the mind in the condition of an army or detachment surprised by an enemy. For the moment there is necessarily panic and confusion, during which the enemy gains at least a temporary advantage, whatever be the ultimate issue of the struggle.

But though by some extraordinary contingency even a thoroughly disciplined army may be surprised and thrown into momentary panic, it is speedily rallied, and shows a bold front to the foe. So a mind under thorough discipline, having the passions under the control of the will, speedily recovers from the shock of sudden surprise, and regains its wonted equanimity. It is marvellous what can be accomplished in this respect by training and habit. It is said that "politicians have no passions." Did statesmen yield to the natural emotions awakened by political events as they occur, stable government would become impossible, and the interests of nations would be sacrificed to ebullitions of excited feeling. Hence, in all contingencies, however much some of them may be fitted to awaken grief, anger, fear, disappointment, elation, and so forth, the true statesman remains

> "Serene, and resolute, and still,
> And calm, and self-possessed."

The self-command of the soldier or statesman shows that by habitual exertion of the will in controlling the emotions, its empire over them may at length become established; and so great are the advantages of this discipline of the mind in all ranks and conditions of life, that no effort should be spared on the part of individuals to attain to as great perfection in it as the constitutional temperament admits of. The "ills of life" will then be as transient in their influence over the mind as are the sorrows of child-

hood, which, vehement for the moment, are speedily succeeded by joyous smiles and merry laughter.

The difficulty of perfecting the discipline of the mind would be comparatively small did the process of training date from an early period of life. When once the nerves have been shattered and the whole organic functions have got into a state of irritability, it is a work of almost superhuman difficulty to establish the authority of the will over the various mental states so powerfully influenced by morbid physical conditions. It is otherwise when the nerves, organs, and functions of organic life remain intact and unimpaired. The bodily state, then, instead of being a cause of disturbance and morbid irritation to the mind, permeates it with bland and soothing influences. The sympathy betwixt the nerves of organic and those of animal life, *i.e.*, betwixt the ganglionic and cerebro-spinal systems, is fraught in these circumstances with exhilaration, not depression, since the former, being in perfect health and under the influence of appropriate stimulus, the result of good air, good food, good chyle, and good blood, all the instinctive wants of the system are satisfied. Every organ is in perfect condition and performs its functions with tone and alacrity, there is an utter absence of irritation, uneasiness, or pain, the individual "does not know that he has a stomach," nor is conscious of any local feeling, or sensation in any particular part, and this physical quietude and serenity propagates itself by sympathy to the thinking part, which, without being conscious of the source of the exhilaration, feels it in all its powers, faculties, and operations. There is an increased flow and energy of thought, a greater vigour and vividness of imagination, an enhanced clearness and power of memory, and a general elasticity and pleasurable feeling which makes troubles sit lightly on the spirit, and not sit long; for the spirit, conscious of strength, quickly shakes them off, "as the lion shakes the dew drops from his mane." It is when the sympathy between the nervous system

of organic life and the mind assumes and maintains this delightful character, which by observing the laws of health it may be made to do through life, that a man may be said to have "a sound mind in a sound body."

However, when it is the case that an individual suffers from the prolonged pressure of any one of those emotions or passions which disturb the mental and physical health, it is well not to encounter the enemy directly, but to create a diversion by change of scene, so that another atmosphere, new landscapes, fresh faces, may contribute to efface the painful sensations from the mind, while, at the same time, exercise in the open air, judicious diet, and, as a consequence, sound sleep, will tend to bring the organic system into a healthy condition, and thus there is every chance that the enemy, assailed at every point, will beat a retreat. In seeking to effect this end it is to borne in mind that serenity and cheerfulness of mind are more likely to be obtained by such methods as are here recommended, than by excitement and dissipation, which, though they may elate temporarily, are exhausting, and followed by reaction. Extravagant joy, however arrived at, is violent in its effects, and "upsets" the system. But habitual cheerfulness is the handmaid of health, and a great blessing both to the individual and those around him.

Finally, need we do more than refer to the value of the hopes, consolations, and tranquillising influences of religion in all cases of mental disturbance, and to their power to "minister to a mind diseased?" Attention to those great moral truths which remind us of the real character and object of life will help to convince us of the needlessness as well as uselessness of much of our mental disquietude, and favour that serene and calm frame of mind so essential to sound health. In these days, too, when literature of an elevating, instructing, and entertaining character abounds, one can be at no loss to find means for diverting the thoughts

from disagreeable and painful subjects. All these resources should be sedulously taken advantage of, so as to give the mind continual occupation of a pleasurable character. It is when the mind is thrown back upon itself—left to brood over its own troubles until they appear magnified so as to be beyond all bearing—that the most fatal consequences are to be apprehended. To prevent this, every mental and physical influence fitted to counteract such morbid states should be brought to bear upon them.

CHAPTER IX.

THERAPEUTICS.*

FROM the causes stated in the Introductory Chapter, as well as from the voluntary habits of many of the human family, deviations from health, styled *diseases*, are extremely common, and to remove them is the object of therapeutics, or the science and art of cure.

There are three systems of therapeutics, Allopathy, Homœopathy, and Hydropathy. These have for their practitioners educated and qualified men, who, for the most part, honestly carry out the principles and doctrines of their respective systems. As a matter of course, each holds his own system to be the best, and each has arguments to advance in support of his views.

Whenever a person feels himself indisposed beyond what he is satisfied his own limited knowledge of therapeutics can cure (and every man of thirty, says the proverb, should in all minor cases have experience enough to be his own doctor), he should consult a regular practitioner, who is a man of honour and a gentleman. As a rule, all so-called patent medicines should be avoided.

* The reader is referred to "A Manual of Domestic Medicine," by Dr. Ralph Gording, No. 112 of the "Weale Series," for more detailed information on the subject.

more frequent natural action of the bowels. So long as the blood is small in quantity, Nature will concentrate it in the brain and stomach, to secure the carrying on of the two great functions of nutrition and sensation, and so the colon, as well as the external skin, is deprived of its due proportion of blood, and hence its secretion must be but scanty. But when the blood in the body increases in quantity, the colon gets a better supply, and its secretion increases in proportion.

We would not be understood to say that in no circumstances should purgative pills be taken; they may be useful in certain emergencies, and are not unfrequently prescribed by medical men; but the habit of incessant purging is a different thing, and deserves simple denunciation. The existence of this habit is proved by the immense sale of patent medicines, and to such an extent oes it prevail that an eminent physician writes:—"It would seem as if people lived to have stools, and not had stools to live. These last seem, with large classes of English society, to be the alpha and omega of earthly existence—the one thing of never-fading interest, the much-loved object of daily and hourly solicitude; all the gigantic efforts of the reasoning faculty, all the empyrean flights of the imaginative faculty, are postponed for the elevating function of evacuating the bowels!" All this is absurd folly, worthy of ridicule, were not the consequences so serious. Let those who have fallen into the practice at once give it up, and substitute bathing, exercise, and dietetics, for pills, and the benefit of the change will soon be apparent.

To come, however, to the "pathies." The chief is Allopathy (*another suffering*), which proceeds on the principle of counter-irritation, with a view to divert morbid action from the affected part. This is generally done by the administration of drugs and minerals, though the more enlightened members of the profession have now become very sparing in the use of these, and desirous to employ means more consonant with the nature of the human organisation. Yet these physicians

have often great obstacles to encounter in the prejudice of their patients, who imagine that there is some healing charm in an "armament of phials." The late Sir John Forbes, so eminent as a physician, in speaking of these pharmaceutical remedies, says:—"These substances have usurped the place of all other remedies in ordinary medical practice, so that, according to the vulgar notion, the function of the physician consists in little else than the prescription or the administration, and the function of the patient in little else than swallowing them." Of the part they play in the cure of disease he has no great opinion. Nature, he maintains, is the power which alone overcomes morbid action; if medicine is of service it is merely in rousing Nature to put forth her energies, as the whip and spur of the rider are employed to quicken the movements of the horse. But as it is the muscles of the horse that do the work, so it is the *vis medicatrix naturæ* that cures disease. The whip and spur in the one case and the drugs in the other are merely incentives to the action of powers already existing. How far these incentives should be applied is a matter in regard to which there is room for the exercise of sound judgment and discretion; and hence the experience of a medical man is necessary to regulate their use.

Perhaps few physicians are disposed to go so far as Sir John Forbes in trusting to the healing powers of Nature. He holds that art is hardly ever of service in arresting or modifying the course and character of disease. When it is, its office is of the most humble character; it is but the handmaid of Nature. In maintaining this position he has chiefly in view the pharmaceutical means which he denounces as having become invested with an undue measure of importance in the medical art. In this depreciation of the value of drugs he is not, however, alone. Amongst the medical profession, Dr. John Hughes Bennett thus writes in the *Lancet* respecting that universally-employed drug, *mercury*:—

"I need not cite the extravagant praise it has received from its partisans. It will suffice to say that the most accomplished professor of materia medica in these times tells us that, physiologically, it is 'a corrosive, irritant, errhine, cathartic, and astringent; a stimulant, diuretic, diaphoretic, cholagogue, and emmenagogue, and an exciter of the peculiar state of the constitution known as mercurial action, of which salivation is one of the chief local signs.' 'Therapeutically,' he says, 'it is antiphlogistic, alterative, sedative or contra-stimulant, deobstruent, antisyphilitic, and anthelmintic according to Dr. Christison. A drug possessed of such wonderfully extensive and varied powers should certainly by this time have had its virtues universally recognised; yet the fact is, with the exception of its action as a sialogogue and a cathartic, there is scarcely one other of its supposed virtues that is not disputed. . . . . Then as to its mode of administration, what differences exist. Some give it in large, others in small doses; some in acute, others in chronic diseases of the same kind. Its applications are so numerous and contradictory, that the question may well be, not for what disease it is useful, but rather which has not been represented to have been benefited by this drug? In the meantime, it has been admitted that it arrests the appetite, checks nutrition, excites a peculiar fever and erethism, produces a coppery taste in the mouth, furred tongue, and salivation: and the pathologist may well inquire how a poison, operating in such a way, can have any curative tendency whatever.'"

There is at this moment a great change passing over the views and practice of the medical profession in regard to the value of drugs in disease. The uncertainty of their action is one objection to their use: another is the mischief they may occasion. Both these points are brought out in the foregoing quotation from Dr. Bennett. With the exception of quinine in ague, and perhaps one or two other instances, there are no specifics among drugs for the cure of disease; and when several different drugs are

combined in the hope that some one of them may act beneficially on the seat of disease, the excessive abnormal action thus provoked may prove most injurious to the constitution. Nor is it possible, from observation of the action of chemicals in the laboratory, correctly to infer what will be their effect on the living body, which has its own peculiar chemistry.

It may be thought that, such being the case, it is of little use to call in the aid of the physician in cases of disease; but this idea springs out of the erroneous view taken of his office—viz., that it consists in prescribing and administering drugs. The Chinese, we are told, have quite an opposite view of the functions of the physician—paying him so long as he keeps them well, and stopping the payment when he allows them to get sick. We cannot help thinking that this is the more rational view to take of the medical art: "prevention is better than cure." But it is a mistake to imagine that, if the doctor does not give drugs in disease, he can therefore do nothing. His business is to study thoroughly the laws of health, the modes which Nature takes of throwing off morbid action, and the conditions most favourable to her efforts in this direction in every variety of circumstance. All the topics treated of in the preceding chapters of this volume, and many more, having special reference to the management of the sick-room, the nursing, diet, and general treatment of the patient, fall within the physician's province, and should there arise a need for some active remedy, he is at hand to administer it. Regiminal means, and physical means, or remedies applied externally—*e.g.*, bathing in all its forms, rubbing, friction, electricity, galvanism, &c.—are, moreover, within the scope of his functions to prescribe. Besides, the very fact of the patient's being conscious that his case is being watched by one skilled in the healing art, and the cheering visits of the doctor from day to day, exercise an influence on the mind highly favourable to recovery. Even, therefore, though drug-administration were entirely exploded,

which it never can be altogether, the aid of the physician would still be of the highest importance.

The services of members of the regular medical profession will become more valuable in proportion as they avail themselves, without prejudice, of whatever means are of proved curative efficacy; not rejecting a good remedy either because it is old or because it is new, nor yet because it is not the result of professional research and discovery. Things are happily tending in this direction: mischievous drugs, medication, and the no less mischievous practice of indiscriminate bleeding, so fatal to many besides Lord Byron and Count Cavour, are falling into desuetude, and we may hope to see orthodox therapeutists yet recognise every appliance and means fitted to benefit suffering humanity. Already the profession has rendered signal service by many valuable discoveries and in calling attention to those sanitary measures necessary to conserve the health of the public, and this leads to the hope of still further benefit at its hands.

The art of the surgeon, and of the surgeon-dentist, do not fall within the scope of our remarks, but it would not be easy to exaggerate their value and importance, or to calculate the benefits which they have conferred on human-kind. The progress being continually made in these branches of the profession is one of the most gratifying facts calling for notice in this age of enlightened advancement.

The second system of therapeutics is known as Homœopathy (*like suffering*): The principle of homœopathy is, that "like cures like;" that is, take any disease presenting a certain set of symptoms, the medicine which produces like symptoms when administered to a person in health, is the specific for the cure of the disease. This is the corner-stone of homœopathy —*similia similibus curentur*. Another peculiarity of the system is the infinitesimal dose, though some of their writers do not lay much stress on this infinitesimal dose, and take their stand on the great principle of

the system that "like cures like." The homœopath regards his medicines as specifics having a direct action on the disease, *e.g.*, with aconite he maintains he can cure fever; and so with other globules and tinctures, each of which is efficacious in this or that disease.

Sir John Forbes is very severe on homœopathy, which he regarded as a system of pure expectation or waiting for the natural issue of the malady, and refused to credit the globules and tinctures with any efficacy whatever. This, moreover, is the view very generally taken in regard to homœopathy. If it be the correct view, then the large proportion of recoveries under homœopathic treatment requires to be explained. The explanation given is, that these recoveries are due in a great measure to the diet and regimen enforced by the homœopaths. This they stoutly deny, and maintain that, under any diet and regimen—at least, under that diet to which the patient has been accustomed—the medicines are equally efficacious. To decide this point more data are necessary than the public have as yet been furnished with. But the fact that so many recoveries do take place under the homœopathic treatment, speaks volumes in favour of the hygienic measures which it adopts, and which measures it is the object of this volume to recommend. There can be no doubt as to the salutary influence of these, whatever may be thought of the doctrine of "like cures like," or of infinitesimal doses. One good effect, no doubt, may accompany these doses—that of working on the patient's imagination, if he has faith in them, and thus, by the soothing influence produced, aiding the cure.

The homœopaths are entitled to credit for having demonstrated the non-necessity of the excessive drugging which was once in vogue, and thus far they have unquestionably exercised a wholesome influence upon the modern practice of physic. They have helped, too, to ameliorate the ordeal of the sick-bed, saving its occupant from many a nauseous compound, and directing attention to the minor accessories of health and

comfort. This of itself has been a great boon to the community.

The third system of therapeutics is Hydropathy, or, more properly, Hydro-therapeutics (*healing by water*). As most people are aware, its founder was Vincent Priessnitz, a German peasant, whose success in curing disease was something extraordinary. People flocked from all parts of Europe to his establishment at Gräfenberg, and he is said to have effected cures in some 7,000 cases of chronic disease. His system was first explained to the English public by Captain Claridge, and afterwards by Dr. Wilson, of Malvern, both of whom had benefited by a sojourn at Gräfenberg. Able exponents of the principles of the water cure have since come before the public, in Dr. Gully, Dr. H. F. Johnson, Dr. Goodman, and others, from whose writings a very clear and complete idea of the system may be obtained.

The great principle on which hydro-therapeutics as a science is based, is the renovation of the constitution through acceleration of the change of matter—a quickening of the processes of waste and supply. Diseased matter is thus eliminated from the body, and new and healthy tissue made to supply its place.

The means employed to effect these objects are cold applications, which directly abstract heat from the body, and sweating processes, which carry off morbid matter by perspiration. A due supply of nourishing food is relied upon to replace what has thus been abstracted. The influence of the various appliances over the nervous system, which they excite or soothe, as the necessities of the case require, also forms an important element in the curative processes of hydropathy.

Sir John Forbes, whose opinion must be regarded as impartial on such matters, thus speaks of the therapeutic value of the hydropathic appliances :—

"The water cure is a stomachic, since it invariably increases the appetite.

"It is a local calefacient in the wet sheet covered by dry blankets.

"It is derivative; cold friction at one part, by exciting increased action there, producing corresponding diminution elsewhere; the compress frequently acting, if not like a blister, at least like a mustard poultice.

"It is a local as well as a general counter-irritant.

"It is essentially alterative in the continual renewal of old matter; its renewal is shown in the maintenance of the same weight.

"An important hydropathic principle is that almost all its measures are applied to the surface. One of the most formidable difficulties with which the ordinary physician has to contend is, that nearly all the remedies reach the point to which they are directed through one channel. The only means of relieving certain diseases is by inundating the stomach and bowels with foreign, and frequently to them pernicious substances.

"Hydropathy employs a systen of most extensive, energetic, general, and local counter-irritation.

"A fifth physiological feature of hydropathy is the number of coolings. The generation of caloric has been traced to its right source. It results from the burning up of waste matter, which by accumulation would become injurious. It is singular enough that almost all arguments used against cold bathing are the strongest theoretical arguments in its favour. Dr. Baynard, a most sarcastic writer, gives us the following anecdote:—

"'Here a demi-brained doctor of more note than nous asked, in the amazed agony of his half-understanding, how 'twas possible that an external application could affect the bowels, and cure pain within? "Why, doctor," quoth an old woman standing by, "by the same reason that being wet-shod, or cold from without, should give you the gripes and pain within." If a rude exposure of the surface to cold and wet is capable of producing internal disease, there is no doubt that a close relation exists between those agents and the morbid condition of internal parts.'"

In the hands of Priessnitz hydro-therapeutics deserved the name of the "cold water cure." His method of

treatment was severe, and, though often successful, did mischief in some instances. His English disciples adopted his system in its main features, but have greatly modified its details, and availed themselves of appliances with which he was unacquainted. The system as practised by them cannot be called the *cold* water cure, inasmuch as great attention is now paid to the regulation of the temperature of the water employed, and, besides the old appliances of the affusion, dripping sheet, shallow bath, sitz-bath, wet sheet pack, blanket-pack, local compresses, fomentations, &c., the vapour, lamp, and Turkish baths now form part of the *materia medica* of the system. In the use of these various appliances in cases of disease, there is need of the same care and discrimination as in the administration of drugs.

The general effects of the vapour and hot-air baths on the system have already been treated of at p. 67. The value of the Turkish bath as a therapeutic agent stands very high. Its action tends powerfully to eliminate morbid matter, and eminently promotes the processes of nutrition, and a host of medical testimonies might be adduced to prove its efficacy in a great variety of diseases. No other single agent appears to possess such curative powers as this very agreeable and refreshing series of processes. The vapour and lamp baths are also useful in a similar way, but their power is considerably less than that of the Turkish bath, which can be used with comfort at much higher temperatures. These baths form a most important addition to the resources of the water cure. They are speedier and more agreeable, as well as more efficacious in their operation than the blanket-pack, the only sweating process employed by Priessnitz, although undoubtedly the blanket-pack has often done excellent service. In regard to all it may be said that no medicinal sudorifics can at all copmare with them, and the tepid or cold ablutions which are made to follow the sweating processes have an invigorating effect, and obviate all danger of catching cold.

Each appliance possesses a certain definite therapeutic value; and it is in the selection of these to suit particular cases, and in the changing and modifying of them with the varying symptoms of the disease, that the hydropathist shows his skill and judgment. Local disease or irritation he encounters by means of local packs, compresses, &c., and by a variety of local baths, some of an ingenious description. General appliances to the entire body are selected because of the relation their power bears to that of the patient, and it involves attention to the temperature of the water as well as to the mode of applying it, whether by dripping sheet, shallow bath, douche, or any other form of bath. As a specimen of an educated medical man's estimate of the therapeutic value of some of these appliances, we give the following from Dr. H. F. Johnson:—

"The wet sheet lowers the pulse, diminishes the heat of surface, and relieves pain. It is therefore in medical language an antiphlogistic or febrifuge, and an anodyne. It corresponds to the lancet or leech, antimony, calomel, and opium, and other febrifuge and anodyne mixtures. It differs from the four first-named in not being followed by general debility, cachexia, &c.

"The douche sometimes elevates the pulse, but always accelerates the function of respiration, thereby imparting an enlivening influence to all the vital phenomena. It is therefore a diffusible stimulant. Its physiological effects may be compared to those of ammonia, or those produced by the exhibition of small, that is, stimulating doses of opium. Of course its beneficial action is much more permanent than that of either medicine, and it is not liable to be followed by the deleterious consequences that the latter, even in the minutest quantity, does sometimes engender.

"The blanket-packing quickens the pulse and produces perspiration. It is therefore a stimulant and sudorific. But both in its mode of stimulation, and in its sudorific properties, it is peculiar, and stands alone. There is nothing in the pharmacopœia to which it can

be compared. The profession would do well to adopt this process into their therapeutic catalogue. In certain chronic diseases of the chylopoietic viscera, more especially of the liver, when it is not contra-indicated by any active irritation, they would find it a valuable addition to their remedial agents.

"The shallow bath generally quickens both circulation and respiration, always the latter. Like the douche, therefore, it is a diffusible stimulant, but of less power.

"The sitz-bath lowers the pulse, but leaves the respiration unimpeded. Moreover, with some exceptions, it reddens the skin of the parts immersed, of course provided the process endure long enough. It is therefore a sedative, a purifier of the blood, and a derivative or counter-irritant. In the first of these properties it perhaps more nearly resembles foxglove than any other drug. In its third effect, that of counter-irritation, it may be compared with blisters of different kinds and liniments. But with regard to its power of purifying the blood, of course no medicine can compete with it."

Dr. Goodman, the hydropathist, of Southport, has published a "Parallel Table of the Medical Properties of the chief Drugs in use, and the chief Remedies of the Water Cure which possess either similar Properties, or induce like Effects." In this document the various classes of drugs are enumerated together with their medical properties, and over against them are set the hydropathic appliances which are maintained to serve the same purpose. In it he attempts to show that the hydro-therapeutic system has its alteratives, antacids, antiphlogistics, antispasmodics, anthelmintics, anodynes, astringents, depressants, diaphoretics, derivatives, drains, dermasthenics, dispersives, diuretics, demulcents and emollients, emetics, expectorants, emmenagogues, laxatives, aperients and cathartics, narcotics, refrigerants, stimulants, styptics, sedatives, and tonics, as well as the old system of medicine.

Among those who have tried the water cure, and

given to the world their opinion of its merits, is Lord Lytton. Worn out with literary toil, anxiety, and grief, he sought relief in vain from the resources of the chemist, from travel, and from residence in the country. At last he fell in with the work of Captain Claridge describing the processes and effects of the water cure at Gräfenberg, and afterwards with a pamphlet by Dr. Wilson, who had himself made full trial of the system, and had set up a hydropathic establishment at Malvern. Despairing of relief from any other source, his lordship resolved to make trial of the water-cure. He went to Dr. Wilson's establishment at Malvern. The result was most gratifying. The treatment and its concomitants were a source of continual exhilaration, his ailments were gradually mitigated until they almost disappeared, and he obtained "an immense accumulation of the capital of health." The conviction of the benefits he obtained at Malvern induced him to volunteer the details of his experience in his "Confessions of a Water Patient," published originally in the pages of a popular periodical, and since reprinted as a pamphlet.

It is evidently the work of an enthusiastic admirer of the water-cure; but it is no less a literary curiosity, and so folks read it when it first came out, as they do now, with a considerable grain of salt, laughed at much that was said, and gleaned useful hints for personal hygiene from the rest. The writer of this volume, however, having made prolonged and repeated trials of the water-cure, can conscientiously endorse most of what Lord Lytton has said in its praise. No one will doubt the good faith or honest intentions of his lordship, but like homœopathy, hydropathy has first to be rescued out of the hands of an army of empirics before it can be safely trusted as a scientific branch of therapeutics.

The philosophy of the present volume is simply the philosophy of prevention. Let a man keep health while he has it rather than allow it to be lost, and then spend time and money in a perhaps vain endeavour to

recover it. It is so very much easier to keep than to recover. By following the instructions laid down in these pages, "while the organs are yet sound, and the nerves yet unshattered," we trust that our readers may escape altogether the necessity of having recourse to any system of therapeutics. Indeed, as has been shown, the disciples of therapeutics of every school are now all bent more and more upon the employment of ordinary natural agents in the cure of disease than in the drugs of the old pharmacopœia; and if so, how much better to keep those agents continually influencing the healthy body, whereby the inroads of disease may be effectually prevented! We commend this view of the matter to the reader's earnest attention, assuring him that the enjoyment of continuous good health is worth almost any amount of trouble, and that by a careful attention to those laws which Nature has made imperative, he may secure for himself that invaluable blessing until he reaches the allotted period of human existence.

THE END.

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